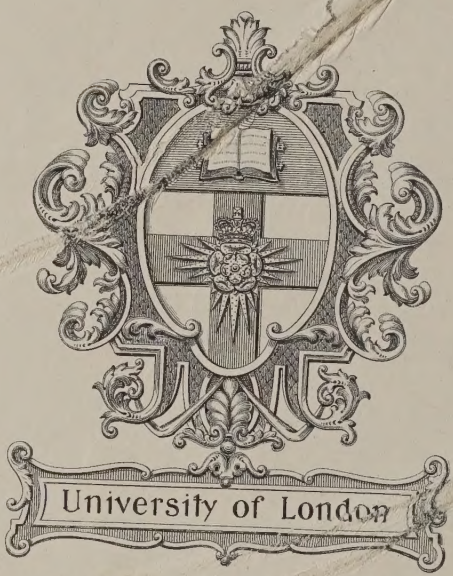
University of London

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REPORTS

FROM

COMMISSIONERS:

TWENTY-TWO VOLUMES.

—*(6.)*—

CATTLE PLAGUE.

Session

1 *February* —— 10 *August* 1866.

VOL. XXII.

1866.

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TWENTY-TWO VOLUMES:—CONTENTS OF THE

SIXTH VOLUME.

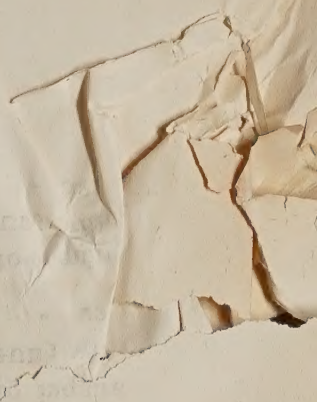
N.B.—*THE* Figures *at the* beginning of the line, *correspond with the* N° *at the foot of each* Report; *and the* Figures *at the* end of the line, *refer to the* MS. Paging *of the Volumes arranged for The House of Commons.*

CATTLE PLAGUE:

[3591.] FIRST REPORT of the COMMISSIONERS appointed to inquire into the ORIGIN and NATURE, &c., of the CATTLE PLAGUE; with the MINUTES of EVIDENCE, and APPENDIX - - - - p. 1

[3600.] SECOND REPORT of the COMMISSIONERS appointed to inquire into the ORIGIN and NATURE, &c., of the CATTLE PLAGUE; w[illegible] the MINUTES of EVIDENCE, and APPENDIX - - - [illegible]

[3656.] THIRD REPORT of the COMMISSIONERS appointed to in[illegible] into the ORIGIN and NATURE of the CATTLE PLAGUE; [illegible] APPENDIX - - - - - - - - - 3



FIRST REPORT

OF

THE COMMISSIONERS

APPOINTED TO INQUIRE

INTO

THE ORIGIN AND NATURE, &c.

OF

THE CATTLE PLAGUE,

WITH THE

MINUTES OF EVIDENCE AND AN APPENDIX.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1866.

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COMMISSION.

VICTORIA R.

VICTORIA, by the Grace of God of the United Kingdom of Great Britain and Ireland Queen, Defender of the Faith: To Our Right Trusty and Right Well-beloved Cousin and Councillor John Poyntz Earl Spencer, Knight of Our Most Noble Order of the Garter, Our Trusty and Well-beloved Robert Arthur Talbot Gascoyne Cecil, Esquire, (commonly called Viscount Cranborne,) Our Right Trusty and Well-beloved Councillor Robert Lowe, Our Trusty and Well-beloved Lyon Playfair, Esquire, Companion of Our Most Honorable Order of the Bath, Clare Sewell Read, Esquire, Henry Bence Jones, Esquire, Doctor of Medicine, Richard Quain, Esquire, Doctor of Medicine, Edmund Alexander Parkes, Esquire, Doctor of Medicine, John Robinson M'Clean, Esquire, Thomas Wormald, Esquire, Robert Ceely, Esquire, and Charles Spooner, Esquire, Greeting;

Whereas a contagious or infectious Disorder, which is generally designated the Cattle Plague, now prevails among the Cattle of Great Britain: And whereas We have deemed it expedient that a Commission should issue fully to investigate the Origin and Nature of the said Disorder, and to ascertain, as far as possible, the Mode of Treatment best adapted for the Cure of the affected Animals, and the Regulations which may with the greatest Advantage be made with a view to prevent the spreading of the said Disorder, and to avert any future Outbreak of it;

Now know ye, that We, reposing great Trust and Confidence in your Knowledge and Ability, have authorized and appointed and by these Presents authorize and appoint you the said John Poyntz Earl Spencer, Robert Arthur Talbot Gascoyne Cecil (commonly called Viscount Cranborne), Robert Lowe, Lyon Playfair, Clare Sewell Read, Henry Bence Jones, Richard Quain, Edmund Alexander Parkes, John Robinson M'Clean, Thomas Wormald, Robert Ceely, and Charles Spooner to be Our Commissioners for the Purposes aforesaid.

And for the better enabling you to carry these Our Royal Intentions into effect, We do hereby give and grant to you, or any Three or more of you, full Power to call before you such Persons as you shall judge likely to afford you any Information on the Subject of this Our Commission, and to inquire of and concerning the Premises by all other lawful Ways and Means whatsoever.

And We do by these Presents will and ordain that this Our Commission shall continue in full Force and Virtue, and that you Our said Commissioners, or any Three or more of you, may from Time to Time proceed in the Execution thereof and of every Matter and Thing therein contained, although the same be not continued from Time to Time by Adjournment.

And Our further Will and Pleasure is, that you Our said Commissioners, or any Five or more of you, upon due Inquiry into the Premises, do report to Us in Writing under your Hands and Seals your several Proceedings under and by virtue of Our Commission, together with what you shall find touching or concerning the Premises.

And We further ordain that you, or any Five or more of you, may have Liberty to report to Us your Proceedings under this Commission from Time to Time, should you judge it expedient so to do.

And for your Assistance in the due Execution of this Our Commission, We have made Choice of Our Trusty and Well-beloved Mountague Bernard, Esquire, to be Secretary to this Our Commission, whose Services and Assistance We require you to avail yourselves of from Time to Time as Occasion may require.

Given at Our Court at Saint James's the Twenty-ninth Day of September 1865, in the Twenty-ninth Year of Our Reign.

By Her Majesty's Command,

(Signed) G. GREY.

FIRST REPORT

OF

The COMMISSIONERS appointed to inquire into the ORIGIN and NATURE, &c. of the CATTLE PLAGUE.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

Your Majesty was pleased, by your Commission dated the 29th day of September 1865, to intrust to us the task of investigating the origin and nature of a disorder which now prevails among the cattle of Great Britain, and is generally designated the Cattle Plague, and of ascertaining as far as possible the mode of treatment best adapted for the cure of the affected animals, and the regulations which may with the greatest advantage be made with a view to prevent the spreading of the said disorder, and to avert any future outbreak of it. Your Majesty was at the same time pleased to ordain that we, or any five or more of us, might have liberty to report to you our proceedings under the Commission from time to time, should we judge it expedient to do so.

The terms of the Commission therefore authorize us, if we think fit, to report specially to Your Majesty on any part of the subject committed to us, reserving other parts of it for further investigation. The nature of the calamity under which England and Scotland are at present suffering, and which may at any moment attack Ireland, the extensive growth of the disease, its destructive character, and the imperfect success which has hitherto attended all endeavours to arrest its progress, make it clearly our duty to take this course, and to lose no time in humbly presenting to Your Majesty such Recommendations as, after careful consideration, we believe the emergency to require. We shall introduce them with a brief statement on the history of the disease and on its general character.

I.

The disease, which is the subject of this inquiry, was first observed and recognized in Great Britain towards the close of the month of June. Two English cows had been purchased on the 19th June in the Metropolitan Cattle Market by a cowkeeper residing in Islington, in whose sheds they were when the symptoms of disease attracted, on the 27th, the notice of the veterinary surgeon in charge. Similar symptoms were observed on the 28th by the same surgeon in a cow belonging to a dairyman in Hackney, which had been purchased in the same place and on the same day. Two Dutch cows in a Lambeth shed, likewise bought in the market on the 19th, were attacked on the 28th. The malady broke out immediately afterwards in many London dairies, and spread with extreme rapidity, destroying great numbers of animals. The Islington cowkeeper lost her whole herd of 93; she afterwards bought more and lost them also, making 106 or 107 in all. An inspector who had charge of a great part of the north and north-east of London states that in his own district more than four fifths have either died or been slaughtered, and the general average within the precincts of the Metropolis is probably at least as high. Very early in July it appeared in Norfolk; a little later in Suffolk and Shropshire; then in one county after another, and before the end of the month it had invaded Scotland. In all the earlier cases at least it seems to have been directly traceable to purchases made in the Metropolitan Market; but Norwich Hill and other country markets speedily became, in their respective districts, subordinate centres of infection. On the 14th October it had extended into 29 counties in England, 2 in Wales, and 16 in Scotland, and was still advancing.

The subjoined tabular statement, prepared by the Veterinary Department of the Privy Council Office from such official information as that department has received from inspectors throughout the country, has already appeared in the public papers :—

	Attacked			Total Cases reported from the Commencement of the Disease.				
	Week ending Oct. 14.	Week ending Oct. 21.	Week ending Oct. 28.	Attacked.	Killed.	Died.	Recovered.	Remaining.
1. Metropolitan Police District	158	194	158	5,773	2,557	2,529	202	485
2. South-eastern Counties -	225	154	205	3,284	1,169	1,667	197	251
3. South Midland Counties -	73	94	230	833	373	282	42	136
4. Eastern Counties - -	141	183	335	3,081	1,051	1,482	161	387
5. South-western Counties -	17	11	3	116	51	45	7	13
6. West Midland Counties -	31	9	31	214	74	112	4	24
7. North Midland Counties -	8	32	18	109	54	41	6	8
8. North-western Counties -	28	39	42	176	55	75	6	40
9. Yorkshire - - -	26	39	113	253	66	126	11	50
10. Northern Counties - -	47	86	34	472	212	201	24	35
11. Monmouthshire and Wales	43	60	38	180	51	110	4	14
12. Scotland - -	257	828	666	3,182	1,153	1,241	184	604
Total - - - -	1,054	1,729	1,873	17,673	6,866	7,912	848	2,047

It must be remarked however, that such statements as this cannot be accepted as accurate accounts—which, indeed, they do not profess to be—of the real state and progress of the disease. They represent such cases only as the several inspectors have been able to detect since they were respectively appointed. But information reaches the inspector indirectly, by accident, or by common report; and a butcher, jobber, dairyman, or farmer has strong motives for not disclosing to the inspector anything that he can easily hide. We were told by a London cowkeeper that, of 41 cows which died or were slaughtered on his premises, the inspector got only the knacker's receipt for the 11 that actually died of the disease. It must, therefore, we fear, be assumed that the cases reported form but a small proportion of those which have actually occurred; and it would be unsafe to draw from them any inference as to the amount of loss actually caused by the Plague.

Meanwhile, from the same general centre, the Metropolitan Market, it appears to have crossed the sea to Holland with some Dutch oxen which had been shipped from Rotterdam to London, had been exposed during three successive market days, and, not finding a sale at an adequate profit, had been re-shipped from London to Rotterdam. The disease broke out among them soon after their return, when they were pasturing at Kethel, near Schiedam, in a long strip of meadow, on which other strips abutted, each occupied by stock; it spread at once in many directions, and soon overran the whole province of South Holland, and thence, we believe, it has been from time to time re-imported into this country. The measures adopted in the Netherlands seem to have been at the outset less stringent than was desirable; too much discretion was left to the local authorities; but the provinces of North Holland, Utrecht, and Guelderland have, by strictly guarding their respective frontiers, protected themselves in a great measure from the contagion.

In both France and Belgium importation from England has been prohibited, and stringent and minute regulations have been issued by the Government of each country with a view to extinguish the disease wherever it might break out. These measures appear to have been successful. Only a few isolated and somewhat doubtful cases have been hitherto reported from each of these countries.

Twenty-three days at least before the first outbreak in London, a parcel of Russian bullocks, the first, it is asserted, that were ever brought direct from that country to England,* were sold in the Metropolitan Market by the importer, a London cattle-salesman. They had been shipped at Revel and landed at Hull; part of them had there been sold, and sent to various places in the north of England, and the rest despatched to London. The southern provinces of Russia are, if not the birth-place, the constant home of a disease which, as we shall hereafter show, is identical with the Cattle Plague, and to this cargo the introduction of the Plague into England has been often and confidently ascribed. Some obscurity hangs over the earlier history of the transaction. That the province of

* A copy of an entry from the books of the London Custom House has been sent to us, from which it would appear that 20 Russian oxen were landed at London from St. Petersburg on the 4th July 1860. The point is of no importance.

Esthonia, where the cattle were contracted for, and where the bulk of them, at least, were collected, was at and before the date of the shipment free from the Plague is certified by authority which we should be reluctant, and have indeed no ground, to question. But it is alleged by the importer's agent, who procured and shipped the animals and had charge of them on the voyage, that a few (13 out of 321) were not Esthonian, but part of a larger lot brought in vans from the neighbourhood of St. Petersburg to make up the number required; and he further alleges that out of this lot two were ill at Revel with a disease which he believes to have been the Cattle Plague. This part of his story is flatly contradicted by his principal, as his assertion that the animals were not examined on landing is by the Customs' Inspector at Hull.* It must be added that he does not know the disease otherwise than by description—that of the 321 imported none appear to have shown any signs of disease, except one, which was ill on the voyage, but looked well when it reached London—and that no animal is proved to have contracted the disease in the Metropolitan Market from the 1st (the date of its supposed introduction) to the 19th (that of its supposed transmission to the Islington, Lambeth, and Hackney cows), a negative circumstance of no great weight, since an early case of the malady may easily have been mistaken for one of pleuro-pneumonia, but not to be left out of consideration. The facts then, though by no means inconsistent with the theory which attributes the appearance of the Plague in England to the Revel cargo, fall far short of establishing that theory, unless we assume that the event cannot possibly be accounted for in any other way. Further inquiry may throw new light on the question. At present we are not able to pronounce a decided opinion on it; nor, for the practical conclusions which we are about to offer, is it material on which side the truth lies.

ANOTHER SUGGESTED EXPLANATION.

Another explanation has been suggested in the following extract of a letter from Her Majesty's Consul-General at Hamburg:—

"Mr. Schrader, an intelligent veterinary surgeon, who is specially employed by the Hamburg Government to examine cattle and sheep shipped for foreign ports, has informed me he thinks it most probable that the murrain has been introduced into England by importation from Holland. He states that in the course of the last spring a considerable number of Hungarian cattle were conveyed from Vienna into Holland through Germany by land carriage and river navigation; that at the same time the rinderpest had broken out in the neighbourhood of Vienna, particularly in the village of Florisdorf; and that in the month of May a number of cattle at or near Utrecht in Holland had been attacked by it. Although, therefore, the murrain in Holland broke out with much greater violence at a later period of year, it would be quite possible that it passed from the Dutch ports into England so early as the month of May last. With respect to the rumour of diseased cattle having been imported into England from the Russian port of Revel in Esthonia, either directly or by way of Lubeck, no credit is attached to it here, and indeed the great distance of Revel both from Great Britain and from the cattle districts in Southern Russia, seems to render it unlikely that diseased cattle should have reached England from that port without any observation."

IMPORTATIONS FROM HUNGARY AND GALICIA.

One fact mentioned in this letter, and which has also been elicited in evidence, deserves particular attention, since it is of more than historical importance Hungarian and Galician cattle now undoubtedly come in considerable numbers to the English market. "Large quantities," says one dealer, "are sent every week." Hungary and Galicia, from their neighbourhood to the steppe country of Russia in Europe, are often attacked by the Plague, and Hungary at least has suffered severely from it during the present year. The completion of the two great lines of railway which, traversing central and southern Germany, now connect Hamburg and Rotterdam with both Vienna and Lemberg, have opened to us these new supplies. Respecting the average duration of the transit we have no precise information, nor do we at present know how far it may be abridged in particular cases, nor by what regulations it is guarded at the beginning or end of the journey. We may have occasion to recur to this point hereafter; at present we advert to it only as suggesting a possible solution of the question how the Cattle Plague reached England.

II.

THE DISEASE CONTAGIOUS.

That the disease in question is contagious, that the contagion is extraordinarily swift and subtle, and that it is most destructive in its effects, there can be no doubt whatever.

GENERAL CHARACTER OF THE CONTAGION.

The manner in which it has spread, travelling perceptibly, for the most part, in the track of animals brought from some centre of infection, and establishing a new centre wherever

* It is proper to add that we have been furnished with the original certificate, dated the 29th of May, and signed by the two veterinary surgeons who were charged with the examination of the cargo, that they had examined it, and that it was sound and free from disease, as well as with a subsequent declaration by them to the same effect.

it has been suffered to effect a lodgment—the very difficulty that has been often found, even where the fact of infection was certain, in tracing the exact means by which the infection was conveyed—the havoc it has made in open pastures not less than in the London cowsheds, and against which fresh air, wholesome food, and careful tending seem to have afforded no defence, would be quite enough to establish these conclusions, even if no light were thrown upon them by past history, or by the experience of other countries. Of the witnesses, indeed, whom we have examined, even those who believe it to have been spontaneously generated here, acknowledge that it is contagious, and (with hardly an exception) admit that it is new in England.

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DERPEST
STEPPE-
RAIN.

But we see no reason to question the evidence which has been produced before us proving that it is the same disease as that which has been long known under the name of the *Rinderpest* (Cattle Plague), or steppe-murrain. The symptoms during life, the results of post-mortem examination, and the whole train of general characteristics, are precisely the same, or varied only by such minute shades of difference as we might expect to find in different breeds and climates. A comparison of what we see with the full descriptions contained in foreign medical works leaves on this head no doubt at all; and no doubt is entertained by competent and trustworthy witnesses who have had and used opportunities of personal observation both here and abroad. The whole experience gained of it in countries where it is not, as here, a stranger,—countries frequently infested by it, where its effects are perfectly well known, its nature has been carefully studied, and the strictest measures have been devised and are enforced by law to detect and extirpate it as often as it crosses the frontier,—becomes, therefore, at once available for our guidance. These measures are wholly based on the view that the disease propagates itself by contagion, and by contagion alone, and the extreme stringency of them proves in the most forcible manner the virulence and activity of the evil which they are designed to keep at bay. They are measures indeed which never could be enforced,—they involve sacrifices to which no people could be reasonably asked to submit,—unless in the presence of a dreaded enemy, and under a sense of overwhelming necessity. The same view is, we believe, universally held among the eminent veterinarians of Germany, men of high education and intelligence, and it has recently been endorsed by the Congress of veterinary surgeons held at Vienna in August last, which was attended by members of the profession from almost every country in Europe.

LIER
TLE
RAINS
NGLAND.

This is not, however, the first time that this Plague has visited England. Fatal murrains among cattle, analogous to, if not identical with, it, have at various times appeared here. In 1348–9, after the Black Death had produced great mortality among men, a grievous plague attacked cattle, which perished by thousands. A great rise in the price of food followed, notwithstanding an abundant harvest. The diseased cattle were slaughtered, and infected herds were as much as possible separated from those which were sound, while the herdsmen who attended the former were not allowed to come in contact with the latter. About a century later, in 1480, a second murrain of the same kind committed great devastation. There is no accurate account of the symptoms exhibited by cattle attacked during these murrains, and we are therefore unable to ascertain whether they were different from or identical with the present disease; but there is every reason to believe that the distemper which in 1715 made a brief inroad but was promptly expelled, and which in 1745 renewed the attack and held its ground till 1757, was exactly the same as the present Plague. Of this we have proof in the descriptions extant of the symptoms then observed, and of the morbid appearances after death. In a paper communicated to the Royal Society in January 1746 by Dr. Mortimer, he ascribes the origin of the murrain to two calves imported from Holland by a farmer living near Poplar, early in 1745. The spring and summer had been very wet, the autumn dry and cold, the early winter cold and damp. The disease communicated to the cows of this farmer spread through Essex, reached London, and was propagated in various directions from the metropolitan markets. It entered Berkshire, however, by two cows bought at a fair in Essex. Almost simultaneously with its appearance in London, a violent distemper broke out among the horned cattle of Argyllshire, sweeping off 6,000 beasts; but there is no exact information as to the nature of the Scotch murrain. The disease for some time advanced in a manner which appeared to justify the Government in treating its attacks as mere local outbreaks, and it was nearly a year after its first appearance that the country became sufficiently aroused to use national measures for the repression of it. But by this time it had taken too deep root for these to be effective. A Commission for Middlesex was appointed on the 25th November 1745. The Commission, with the short experience of 1715 to guide them, appointed various cowkeepers and butchers as inspectors of cattle, and instructed them :—

1. To inspect cowhouses and to separate sick from sound cows.
2. To see that all cowhouses and yards were kept thoroughly clean.
3. To kill all sick cows and calves, to slash their hides so as to render them useless, with several cuts from head to tail and round the body, and then to bury them in graves ten feet deep, with two bushels of unslacked lime to each cow.
4. To certify to the destruction of cows, for each of which the Treasury gave 40*s*.
5. To see that proper returns were made by cowkeepers as to their losses.

The disease having spread beyond Middlesex, an Act was passed and received the Royal Assent on the 13th February 1746, empowering the Crown to issue, through the Privy Council, rules and directions in order to prevent the distemper spreading amongst horned cattle.

On the 12th March 1746, an Order in Council was passed in which the incurable nature of the malady is set forth and the following regulations appear:—

1. Cowkeepers must shoot infected beasts, and bury them entire with slashed hides, four feet deep covered with lime. (The direction as to the use of lime was subsequently revoked.)

2. All hay and litter used by diseased animals must be burned. No herdsman who has attended a diseased beast is to go near a sound one without changing his clothes.

3. Infected sheds must be thoroughly washed all over, then disinfected with burning sulphur, &c., again repeatedly washed with vinegar and water, and not used for two months.

4. Convalescent animals are not to be mixed with sound ones for one month, and not then till they have been well curried and cleansed with vinegar and water.

5. Flesh and entrails of diseased cattle are not to be given as food to other animals.

6. No man whose herd is infected is to be allowed to drive any cattle, whether diseased or not, beyond the boundary of his farm. And even when disease has disappeared, his herd is to be held infected for a month.

7. Local authorities, such as churchwardens, overseers, constables, or cattle-inspectors who may be appointed, are charged to see to the execution of this Order. They are to report to each meeting of Justices and make exact returns.

8. These local authorities are to persuade owners to divide up their herds into separate parts; they are not only to see to the burying of diseased cattle, but also the burial of all infected dung.

9. Cattle travelling on roads are to be stopped and examined.

10. Houses, buildings, or yards used for cattle, sound or diseased, are to be carefully kept clean.

11. Compensation for slaughtered cattle is to be paid at the rate of 40*s*. per head; for calves 10*s*.

Towards the end of the year the Government found that the local authorities had not assisted them vigorously in the execution of the first Order, and they issued a second to the effect that from the 27th December for three calendar months no person shall send to fairs or markets any cattle except for immediate slaughter, or "buy, sell, or expose to sale" any cattle except those which are ready for immediate slaughter. Nor is this privilege of selling fat cattle permitted to any one whose herd is infected. Therefore all beasts going to fairs or markets must be provided with passes from a Justice, or, failing him, from other competent local authorities, given on the owner's oath that his cattle are and have been for a month free from the Plague.

No raw hides shall be sold or allowed to be transported without like passes, but hides and horns of diseased beasts must absolutely be destroyed, and a compensation of 10*s*. per hide is given.

A third Order in Council was issued, proscribing the district from the Humber and Trent, and not allowing cattle to be driven out of it northwards from the 19th December 1747 to the following 27th March.

On the 13th February 1747 an Act to amend and extend the powers of the previous Act was passed; and this was followed, up to 1757, by various continuing and enlarging Statutes. In addition to the measures before specified, these Statutes also provided that sales of cattle should only take place when the seller had had them in his possession for 40 days; calves were not allowed to be sold, in order that they might be preserved for breeding purposes, and severe restrictions were put on the sale of the hides of diseased animals.

Various Orders were issued during the year 1747, stopping local fairs, and empowering local authorities to do so when they found it expedient.

The Plague in consequence of these Orders was extinguished where the local authorities acted with vigour, but lingered in other places, from whence it spread after a

time as rapidly as ever. In consequence of this, in September 1747 there is a new suspension of all fairs and markets and of all movements of cattle, except for slaughter, throughout the kingdom for three months. This was modified afterwards, sound lean cattle being allowed to be changed to clean pastures, and cows being allowed to go to bulls when both were sound.

The same result followed this new Order as its predecessors. The disease was extinguished in many counties, but lurked in others where the local authorities had been lax in looking after the execution of the Order. Hence in December 1749, the Council admits its failure in putting down the disease, and now again prohibits all movement of cattle except for slaughter, and the place of slaughter must be within two miles of the spot where the cattle are on the 14th December 1750.

The requirement that cattle should be slaughtered only within two miles of their stalls was found very grievous by London and Westminster, and the outcry raised against it by these influential places produced a revocation of it within a month of its issue.

"Unfortunately," says Mr. Youatt, in his well known work, "the restrictions with regard "to the sale or removal of cattle and communication between different districts were so "frequently evaded, that it was either impossible or impolitic to exact the penalties." (Youatt, *Cattle, their Breeds and Diseases*, p. 391.) The system of compensation was carried on for some years until the Government found it produced serious frauds. Every animal that was ailing, or had diseases of any kind, was killed and charged to the Government as having died by the Plague, and in consequence of these frauds compensation was abandoned. One cause of the ill success of the repressive measures adopted, is thus described in the words of Layard, who, writing even in 1757, says: "The disease, thank God, is considerably abated: and only breaks out "now and then in such places where, for want of proper cleansing after the infection, or "carelessness in burying the carcases, the putrid *fomes* is still preserved, and is ready, "at a proper constitution of the air, or upon being uncovered, to disperse such a quantity "of effluvia, that all the cattle which have not had it will be liable to infection." (Layard, *The Distemper among Horned Cattle*, p. xx.)

For some time after the revocation of the Order of 1749, each county proscribed neighbouring infected counties, and refused to receive their cattle. The roads from one county to another were strictly guarded, and cattle, hides, carcases, and tallow from any infected counties were carefully excluded. These measures, however, had but a very partial effect. Cheshire lost in the first half of 1757 and three months of the preceding year about 30,000 head of cattle, and many other counties in proportion. For the next two or three years this local war against the disease was allowed to be waged, the Government occasionally interfering when the magistrates permitted fairs in places likely to be injurious to neighbouring counties It continued up to 1756 with considerable variations, the Plague being intense in some counties, milder in others, and absent from many, until it wore itself out. There is no accurate record within our knowledge of the mortality produced by it. In the third year of the attack 80,000 head were slaughtered under the Orders in Council, and a far larger number perished by the disease. During its course it must have destroyed several hundred thousand cattle.

THE DISEASE IN COUNTRIES BORDERING ON RUSSIA.

There was some dispute as to the means by which England received its infection in 1715 and 1745, but it is certain that the Plague was raging in different parts of western Europe at that time. Wherever during war Russian and Austrian parks of cattle followed the movements of armies, the Cattle Plague appeared, and spread gradually to the adjacent countries. France in this way received it at least half a dozen times in the last century.* From 1711 to 1714 foreign authors state that western Europe lost 1,500,000 head of cattle by the Plague; while from 1745 to 1748 (a period which includes three years of the great English attack) 3,000,000 are believed to have perished in western and central Europe. These figures are probably not exaggerated, considering the great losses sustained by particular states. Thus the Danish monarchy, in the four years from 1745 to 1749, lost 280,000 head, and Holland, in the three years beginning with 1769, lost 395,000 head. These disasters attracted the attention of Governments and scientific men; and the long peace which began in 1816 permitted the adoption of those careful and systematic measures of precaution which, in the countries bordering on Russia, have been maintained ever since with various modifications, and on the whole

* Much interesting information on this part of the subject is contained in a memoir by M. Renault President of the Veterinary School of Alfort, transmitted to the French Minister of Agriculture, and published in several French and English newspapers.

with considerable success. It was ascertained that Europe usually received the infection through Russian steppe cattle sent into Poland and Hungary. These cattle feed in vast numbers on the luxuriant herbage of the steppes in the Russian provinces watered by the lower part of the Dnieper and its tributaries. Large herds of them are annually driven to different parts of Russia, to Poland, Galicia, and Hungary, and often carry the seeds of disease in their train. In 1862 the number attacked by the plague in the Austrian dominions was 296,000, of which 152,000 died. In 1863 it again invaded and overran not only Galicia but the whole of the kingdom of Hungary and its dependencies, the Bukowina, Dalmatia, Carniola, Lower Austria, Moravia, and Styria. Fourteen per cent. of the cattle in these countries took the infection, and the average mortality, as stated in Schmidt's *Jahrbuch der Gesammten Medecin*, 1865 (p. 95), was as follows :—

Hungary	65 per cent.
East Galicia	77 „
Croatia and Slavonia	81·6 „
Military Frontier	83 „
Moravia	88 „
Lower Austria	92 „
West Galicia	94 „
Bukowina and Styria	100 „

It should be added, that the number attacked in the last two provinces was small.

III.

General Characteristics of the Disease as ascertained by experience

Our present experience then, our past experience, and the experience of foreign countries, coincide so far as they respectively go ; they identify the English Cattle Plague of 1865, the murrain of 1745, and the *Rinderpest* of eastern Europe, as the same disease, and they yield some clear and well ascertained results, which may be briefly stated as follows :

The Cattle Plague is, in the language of medicine, a specific disease, belonging to the class of contagious fevers. The contagious matter is subtle, volatile, prolific, in an unexampled degree. It is conveyed in a most virulent form in the excretions from the diseased animal. Any particle of those excretions may serve as a vehicle for it. We know not the limit of time within which it disengages itself from them, nor to what distance it may not be diffused. It may travel, we know, in the hide, horns, hoofs, and intestines of the dead animal ; the offal, therefore, is highly dangerous. It lurks undeveloped in the system for a period about which some difference of opinion exists, which certainly is not less than five days, usually is seven or eight, but appears to be more prolonged in some cases. Towards the end of this period of incubation, but at what precise point we do not know, it becomes capable of diffusing itself by contagion. A diseased animal may therefore be infectious before it shows any signs of disease, or at all events before the malady betrays itself to any but a very close and very skilful observer. The proportion of cases in which it is fatal is extraordinarily large. No specific has been discovered which neutralizes or expels the poison : judicious treatment may enable nature to resist till the virus has spent itself ; injudicious treatment may have a contrary effect ; but that is all. The practical conclusion, therefore, at which foreign physicians and foreign governments have arrived,—the conclusion that it is better always to kill a diseased animal, or a few diseased animals, where by so doing you can kill an isolated germ of disease, instead of suffering that germ to linger and fructify whilst you are attempting a cure, for the precarious prospect of an insignificant saving,—is justified by reason ; it is also directly justified by experience, which shows that, whilst the Plague propagated from a single germ speedily becomes unmanageable, spreads from herd to herd, from province to province, and from country to country, multiplies in a continually increasing ratio, and exhausts itself only after ruinous havoc and a long course of time, it may be effectually eradicated by prompt and unsparing measures. The experience of Prussia is especially valuable in this respect. The plague has often appeared, says Professor Gerlach, in the provinces bordering on the Russian Empire, in East Prussia, Posen, and Silesia, but it has never, since 1815, penetrated eastwards, even so far as Brandenburg. Lastly, we must add, it has not been found to give way before cold weather or rain. The reverse seems to be the case. It is worse, Professor Gerlach informs us, "in cold and wet weather, and better in warm and dry "weather." "It spreads," says Mr. Ernes, "as fast in a cold as in a hot season." The murrain of 1745 broke out here in early spring, the temperature of the preceding year having been low ; and it is stated to have raged most violently during the winters, and to have diminished in intensity with the advance of summer.

Immediate Objects of the Inquiry.

These conclusions, which are all that for our present purpose it is necessary to state, are far, of course, from exhausting all that is known upon the subject. Beyond what is known, however, there is a large field of inquiry which may be usefully explored. To observe carefully the premonitory and progressive symptoms of the disease under various conditions,—to determine precisely the period of incubation, the effect of remedial and of preventive agencies, (including under the latter head disinfectants, therapeutical measures, and inoculation,)—to ascertain within what range, and under what modifications, the poison may be communicated from a diseased cow to other animals of the same or different species,—these are branches of investigation practically important, but which will take time. With a view to the thorough examination of them, we have obtained the assistance of men eminent in various departments of science, and we hope to be able to report on them hereafter. But we have now to deal with more pressing questions. Are the measures hitherto adopted to stifle the Plague at home, and stop its entrance from abroad, effectual for the purpose? If not, what other measures are likely to be effectual? To these questions, having early satisfied ourselves of the general character of the disease, we at once directed our attention; and the evidence which we have received has been chiefly taken with a view to them.

IV.

Preventive Measures hitherto adopted.

The preventive measures hitherto adopted by Your Majesty's Government may be briefly stated.

Act 11 & 12 Vict. c. 107.

By an Act of Parliament, passed in 1848, and continued by several subsequent Acts to the present time, the Lords and others of Your Majesty's Privy Council, or any two or more of them, are authorized to make from time to time such Orders and Regulations as to them may seem necessary for the purpose of prohibiting or regulating the removal to or from such parts or places as they may designate in such Orders, of sheep, cattle, horses, swine, or other animals, or of meat, skins, hides, horns, hoofs, or other part of any animals, or of hay, straw, fodder, or other articles likely to propagate infection; and also for the purpose of purifying any yard, stable, outhouse, or other place, or any waggons, carts, carriages, or other vehicles; and also for the purpose of directing how any animals dying in a diseased state, or any animals, parts of animals, or other things seized under the provisions of the Act are to be disposed of; and also for the purpose of causing notices to be given of the appearance of any disorder among sheep, cattle, or other animals, and to make any other Orders or Regulations for the purpose of giving effect to the provisions of the said Act, and again to revoke, alter, or vary any such Orders or Regulations; and it is enacted that all provisions for any of the purposes aforesaid in any such Orders contained shall have the like force and effect as if the same had been inserted in the Act; and that all persons offending against the Act shall for each and every offence forfeit and pay any sum not exceeding twenty pounds, or such smaller sum as the Council may in any case by such Order direct.

Orders in Council.

Under the powers conferred by this Act, several Orders in Council have been issued, dated respectively the 24th July (fourteen days after the first notice of the outbreak was given by Professor Simonds to the Privy Council Office), the 11th, 18th, and 26th of August 1865, the substance of which was afterwards embodied in a Consolidated Order, dated the 22d September 1865. This Consolidated Order contains the regulations now in force relating to England, Wales, and Scotland. Some further Orders have been made prohibiting the importation of horned cattle and sheep, and regulating the importation of hides, from Great Britain into Ireland, and likewise prohibiting importation into the island and barony of Lewis.

(*a.*) Under these Orders inspectors have been appointed by the Clerk of the Council for the Metropolitan Police District; as to all the rest of Great Britain, the appointment of inspectors is discretionary in England with the Justices of each Petty Sessional Division, in Scotland with the County Justices in Sessions; within municipal boroughs the power is vested in the Mayor or Provost. The discretion, however, may only be exercised where the local authorities are satisfied of the existence of the disease in, or have reason to apprehend its approach to (this was added on the 26th August), the district over which their jurisdiction extends.

(*b.*) Every inspector is empowered to enter and inspect all premises within his district in which any animal (this word is defined as including neat-cattle, sheep, goats, and swine) may be found, to seize, slaughter, and bury animals diseased, and to disinfect the premises, and to order the separation of animals suspected of being diseased.

(*c.*) Owners of diseased stock are forbidden, absolutely, to send to market or expose for sale, to send by highway, railway, or coasting vessel, or, lastly, to turn out on common or unenclosed land any diseased animal: if within an inspector's district, they are also forbidden, without the inspector's leave, to remove from their premises any animal which is diseased or has been in the same shed or herd, or in contact, with a diseased animal, or to place any diseased animal in any field or pasture where, in the inspector's judgment, it would be likely to propagate the disorder.

(*d.*) The local authorities may, by published notice, exclude all animals, or any specified description of them, from any fair or market within their jurisdiction; and no animal is to be sent to the Metropolitan Cattle Market, so long as the Plague exists within the Metropolitan Police District, "except for the purpose of being there sold for immediate "slaughtering, and every such animal, as soon as sold, shall be marked for slaughter in "the same manner in which cattle are ordinarily marked for slaughter in the Metropolitan "Cattle Market." The two latter provisions date from the 22d September.

Inspectors have been appointed under these orders in a large number of districts. Cattle landed at the port of London or at any of the outports are inspected on landing by inspectors appointed by the Board of Customs, who are now veterinary surgeons, except in a very few cases where no veterinary surgeon can be procured.

These Orders have not arrested the march of the Plague, nor can we persuade ourselves that they will materially serve to arrest it, now that it has spread so widely.

Inspection is the instrument on which the chief reliance is placed. But it is not enough to clothe an inspector with the most ample powers as to diseased cattle, if he cannot certainly know whether a beast is diseased or not. During the period of incubation, as the evidence shows, even a skilful practitioner may be at fault. Nor are we by any means sure that in all the infected districts a sufficient number of competent persons have been found, skilled in the diseases of cattle. The demand has been sudden; we have reason to doubt whether it has called forth an adequate supply. At any rate, many cases have been brought to our notice, in which tradesmen or others without professional qualification have been charged with this office. It must be added that an inspector, set to fight single-handed in his own district against this insidious enemy, with a private practice, and among farmers and butchers to whom he looks for employment, has a hard task to perform, and is likely to find their motives and opportunities for concealing the disease more than a match for his means of detecting it.

An important step was taken by prohibiting stock from being sent to the Metropolitan Market, except for immediate slaughter. But how is this prohibition enforced? The beast, if sold, is marked by clipping the hairs of his tail, and this is understood to mean that he is marked for the butcher. But such a mark is sure to lose its significance as soon as the regulation becomes notorious; and, significant or not, there is nothing in it to prevent him from being carried into the country, turned out to graze, or re-sold, while unsold animals are not marked at all. Cases of this kind, where the animals carried infection with them, have been brought to our notice. In fact, of all the cattle which are sent from the country into London, about one-third, after having stood in the market, are distributed again from London over the country.

The discretionary power given to local authorities of closing wholly or partially fairs and markets is still more important, provided it be exercised generally, promptly, and firmly. But, in the first place, such a power is not proper to be entrusted to Mayors of Boroughs and Justices of Petty Sessional Divisions. Wider interests are concerned than these little circles enclose. The Mayor of a town, to which its market brings large and regular profits, is not the fittest judge of the expediency of closing that market before it becomes a source of infection to the surrounding rural district. All Justices are not equally firm, equally ready to do an unpopular thing, equally convinced of the magnitude of the calamity. A large number of markets and fairs have, it is true, been closed, one by one, against lean or store cattle; the example once set has been gradually followed. But what has been done has not been done uniformly. In some places all fairs and markets for both store and butcher's stock have been stopped; in others those for store stock only. The periods of stoppage also have been very various. Here, however, uniform action is everything. Restraints on the ordinary course of business and traffic must be of brief continuance if they are to be strictly enforced; they must be sharp and sweeping if they are to be brief. What is necessary to be done should be done at the same time, wherever it is necessary, or it might almost as well not be done at all. In the second place, the prohibition is easily evaded, and does not go far enough for even its limited object. It is evaded (this also has been repeatedly urged on us) by auctions and other public but unauthorized sales, conducted without even those imperfect checks and safeguards which

exist at a market or fair.* Small jobbers too, we are informed, are beginning to roam the country with droves, out of which they supply customers who are not nice as to what they buy. It would be difficult to invent means better adapted to sow infection broadcast.

OTHER MEASURES REQUIRED.

We are convinced then that other measures are required. We proceed to consider what those other measures should be. In doing so we shall endeavour to point out clearly the general course which we think should be pursued, without entering into details, which more properly belong to Your Majesty's Government.

V.

We are perfectly sensible that this is a question of extrême difficulty. The difficulty lies in the magnitude of the sacrifices we have to call for, the inadequate notion which prevails of the extent of the evil to be subdued, the facilities for dishonest evasion and the risks from inadvertence which spring up with every attempt to mitigate those sacrifices. For it must be observed that we have not merely to guard against criminal or unscrupulous acts: nothing is easier than for a man, without being guilty of so much as gross negligence, to become the means of spreading infection over a whole county.

SYSTEM OF CORDONS.

Let us first say a word about the system employed with so much success in Prussia; we mean the system of *Cordons*, by which infected places are isolated, and the disease either suffered to exhaust itself or stamped out by indiscriminate slaughter. Nothing can be more efficacious where the disease is confined to a very few points; but in order to be efficacious the isolation must be complete and must be soon over, and slaughter (as the Germans themselves hold) is merely wasteful where the number of animals is large. When the disease has widely diffused itself, and disappears at one point only to appear at another, the difficulties of isolation become greater, and the chances of its being efficacious less. We need hardly add that in countries accustomed to a strict half-military police and the constant presence of soldiery, where men and cattle are lodged in close-packed villages encircled by tracts of open ground, and where the system itself is well known and the necessity for it felt, it finds facilities which would be wanting among our lanes and scattered homesteads, with a people to whom it was novel and who are unused to restraints and jealous of interference. These considerations are by no means conclusive against the application of it, with some modifications, to England, far less against resorting to it in Ireland, but they warn us against expecting too much from it, or relying on it alone.

ONLY COMPLETE REMEDY TO STOP CIRCULATION.

Against a disease which is highly contagious, undiscoverable at a certain stage, and too widely diffused for an army of inspectors to cope with it, there is clearly but one remedy which would be certainly and absolutely effectual. That remedy is, to prohibit everywhere for a limited time any movement of cattle from one place to another. Enforce this, and, within a time which cannot last very long, the disease is at an end. It must stand still, and it must starve for want of nutriment. This great sacrifice would certainly eradicate the evil; we cannot say so of any sacrifice less than this.

DIFFICULTIES OF THIS.

We are perfectly sensible of the vast train of losses and inconveniences, public and private, which must attend upon such a measure; and the possibility of mitigating them by circumscribing the prohibition in different ways, without rendering it ineffective, is a point to which we have given the most anxious consideration.

DISTINCTION BETWEEN STORE AND FAT STOCK.

The distinction which may be drawn between lean and fat stock, or rather between cattle moved from place to place for the sake of grazing or fattening, and cattle moved with a view to immediate slaughter, here suggests itself at once. In the case of store stock, the risk of propagating infection is on the whole great, and the evil of stopping circulation is less. The farmer who has lean animals to dispose of, and the farmer who has winter food for them to consume, must undoubtedly suffer; and there might be reason to apprehend some diminution in the supply of winter-fed stock for the spring and early summer of next year. But it must be remarked that the fear of infection now deters many farmers—in infected counties, indeed, all but the very needy or the imprudent—from buying at store markets; and that the persons who would lose most by the application of the remedy are also those who are most deeply interested in the matter, and will be the greatest losers if no effectual remedy is found. We have little difficulty, therefore, in arriving at the conclusion, not only that public sales of lean stock should be suspended for a time, but that private sales, over which it is impossible to exercise an effective control, should be stopped likewise.

On the other hand, to interfere with the circulation of fat stock is to interfere directly with the meat market; and to embarrass it is to raise, for a time at least, the price of

* A later Order, issued on the 31st October, prohibits, wherever fairs or markets have been closed by the local authority, the "bringing or sending" of animals to any place for the purpose of exhibition or sale, and the receiving, exhibiting, buying, or selling of animals so brought or sent.

meat. To require that every bullock sold for slaughter shall be slaughtered on the premises of the seller, will undoubtedly in a multitude of cases be inconvenient to both farmer and butcher. There will be difficulties about the actual slaughtering, about the disposal of hides and offal, about transport; and these difficulties appear still more serious when we consider the manner in which the live-meat trade is now carried on, through salesmen and jobbers, and the vast quantities of fat cattle continually in motion to and from London, and from one market to another. A large system of trade and transport will have to be deranged, and many new arrangements to be made, and the cost of effecting these changes on the spur of the moment must fall to a considerable extent on the consumer of meat.

Questions which would spring from such a Distinction.

If the distinction be admitted, however, many other questions arise. In the first place, how is it to be enforced? If a privilege is conceded to cattle destined for the butcher, how are we to make sure that a particular animal is really destined for the butcher, or that he will be slaughtered immediately, or slaughtered at all; or that he will not scatter infection on his road? May he be driven home by the nearest country butcher who will buy him, or must he be sent to market? May he go to any market, or only to one where conveniences for slaughtering and for careful inspection are or can be provided? May he, if unsold, be sent home again, or transported from one market to another, or if not, what chance will the seller have, should the market be over-stocked, of making a fair bargain? In considering these points, it must be borne in mind that a butcher has, as some witnesses have remarked to us, facilities which a farmer has not for concealing the presence of the disease; and that he has not those motives for being on his guard against it which the farmer has. A farmer who brings home a diseased animal may probably lose his whole herd. But it is often the butcher's interest to ask no questions.

Answers more or less complete may be furnished on all the points above enumerated, and precautions may be devised with a view to each of them. In general terms it may be stated that such precautions must in the main rest on some or all of the following expedients:—On a modified adoption of the *Cordon* system; on the imposition of new and peculiar legal obligations upon butchers, and probably upon drovers, railway companies, and the authorities in charge of markets; lastly, on a system, more or less extensive, of permits, certificates, or declarations. We ought not, however, to shrink from distinctly saying that no answers can be given which, in our judgment, are perfectly satisfactory, and no precautions invented on which it is possible entirely to rely; and that we believe it to be best for the country, and even for the interests which will suffer most in the first instance, that the prohibition against the circulation of cattle should be maintained in its integrity.

Reasons for general Prohibition.

We have stated frankly the difficulties and sacrifices for which the country must be prepared, should this proposition be carried into effect. Of these difficulties the one which will probably be felt most strongly relates to the supply of food to the great towns. Fears have been expressed that to close the Metropolitan Market, for instance, against the influx of cattle from the country, would create a famine. We have already seen that the attempt to restrict the markets of London and Westminster during the Plague which raged here in the reign of George II. was given up on account of the clamour which it created; and it may be argued that the same thing would happen now. Circumstances, however, have widely changed. In the days of George II., meat could only be transported to London alive; even the roads along which the cattle travelled were what we should now think few and bad; there was little importation from abroad, and some difficulty must have been often found in supplying the wants of the metropolis by the ordinary means of communication. Now, every place where fat cattle are fed in large numbers is approached by railways which can transport dead as well as live meat; and it seems no unreasonable demand to require that, for the sake of averting a calamity of almost incalculable magnitude, London should be content to be supplied with dead meat from the provinces, instead of constituting herself a hotbed of infection by receiving twice a week great throngs of living cattle. This change is indeed in itself economical and advantageous, and appears to be gradually taking place as a natural consequence of the extension of the railway system. There is obviously an immense waste of labour in bringing the live animal to London in order that certain portions of its carcase may be consumed as human food; dead meat is more easily carried than the living creature, and it seems quite as reasonable to carry the butcher to the ox as to bring the ox to the butcher. We are informed that from Aberdeen alone upwards of 1000 carcases are sent up weekly to the English metropolis during eight months of the year, and 300 or 400 during the remaining four months, and that special dead-meat trains leave Aberdeen on this errand five days in the week. Nor is it to be forgotten that London is at the

present moment fed in a great measure with foreign cattle. From the 16th September to the 18th October last, both inclusive, the number of English beasts in the market was but 14,645 to 20,185 foreign. It must further be observed—and this is the most important point—that a general prohibition is capable of being thoroughly enforced. The mere presence of a beast on any highway will be sufficient to prove the infraction of the rule. Any plan which, while laying down the general prohibition, admits exceptions in favour of cattle removed to particular places or for particular purposes, must rest upon the ascertainment of facts more or less complicated, to be proved by certificates from local authorities, upon the accuracy of which, experience warns us, little reliance can be placed. The liberty to remove cattle for particular purposes is sure to be extended and abused for other purposes. A man has only to profess an intention in accordance with the law in order, by a little dexterity, to obtain under such a system the utmost facility for violating the law. It will be a long time before the rules are understood, and the period in which they are violated through ignorance will be succeeded by the period in which they are evaded by design. England is probably the worst country in the world for the working of a system of certificates, permits, licences, and passports; and the temptation to violate the rules will be very great, for the thought that naturally occurs to every one whose herd is attacked is to conceal the existence of the disease until he has got rid of those animals which do not yet show symptoms of its presence. To the objection, true as far as it goes, that the embarrassment thus thrown in the way of trade will probably tend to raise the price of meat, it may be answered, first, that such a rise in the price of meat will afford, at the expense of the community, the means of reimbursing the trade for the sacrifices it has made for the common benefit; and, secondly, that the immense destruction of cattle which such a measure is alone calculated to prevent is likely to raise the price of meat to a higher point, and for a longer time, than a regulation which really does little more than change the place of slaughter from large towns to country districts and places of importation. In the period from 1745 to 1757, almost every measure, short of the one which we are considering, was tried in vain. The disease at first advanced slowly, but it lasted 12 years, and then died out, apparently for want of animals susceptible of its influence, although the difficulty of communication from one part of England to another offered at that time the fairest chance for the success of palliative measures. England has now to contend with the Plague under disadvantages never experienced by any other country. The density of her population, the large quantity of her horned stock, and, above all, the enormous facility of communication by railroad, make her peculiarly liable to the ravages of a contagious disorder, and render the prospect of eradicating it within any reasonable time, either by slaughter or by curative and disinfecting measures, almost hopeless.

Recommendations.

1. *Suspension of Cattle Traffic in Great Britain.*

For the reasons stated above we feel ourselves compelled to recommend to Your Majesty that such measures shall be taken as may be requisite to invest, with as little delay as possible, some high officer of Your Majesty's Government with the power of suspending for a limited time the movement of cattle from one place in Great Britain to another, for extending or shortening such period, and for renewing the prohibition as often as circumstances may render necessary.

2. *Suggested Regulations as to Cattle Traffic, should Recommendation* 1. *not be adopted.*

We believe that this measure offers, as we have already said, the only certain means of eradicating the disease, and we conceive that the end amply justifies us in proposing to the nation so great a present sacrifice. In submitting this, however, as our First Recommendation to Your Majesty, we are well aware that it is likely to excite much opposition; that the difficulties to which we have adverted may to some appear insurmountable; and that to those who do not regard the Cattle Plague in so serious a light as we do, the remedy may seem worse than the evil. This view may possibly be shared by Your Majesty's Ministers; we think it right, therefore, to go further, and to indicate the measures which might, in our opinion, be advantageously adopted, should an absolute suspension of the movement of cattle in Great Britain not be enforced.

a. For a period to be fixed, and which might, if necessary, be extended, no lean or store stock should be permitted to be sold at any fair or market, and sales of such stock by auction or advertisement, or in any other manner whatever, should be prohibited.

b. Cattle might be moved for immediate slaughter to a market or to a slaughter-house licensed for use, but only under a license for transit granted by the magistrates in Petty Sessions. The license for transit should certify to the healthiness of the district from which the cattle come. With this exception, and except in the case of cattle driven from one part of the same farm to another, the transit of cattle over any public road (including railways), or in any coasting vessel, should be absolutely prohibited.

c. Precautions should be taken that every animal sold for butcher's meat be slaughtered within a short and fixed period. It may be convenient for this purpose that no slaughter-house should be used without a license from the local authorities, and no such license given except on the butcher's undertaking to have all cattle which may be sold or consigned to him driven direct to the slaughter-house or premises attached to it, from whence they are not to be moved alive. Cattle sold at a fair or market should not be allowed to leave the precincts of the borough or other place where the fair or market is held (in the case of London, the Metropolitan Police District) alive. To ensure this object, it might be required that cattle entering a fair or market should be branded or marked on entrance, and cattle sold elsewhere to a butcher similarly marked at the time of sale, and that it should be penal for any one but a butcher to have a marked animal in his possession. If any regulation of this kind is adopted, it would be advisable that in every place where a public market is held, lairs should be provided in which unsold animals could remain from one market day to another.

d. It would be desirable to draw some more distinct line between infected and uninfected districts than is at present traced by the Orders in Council. For this purpose, whenever a case of infection is discovered, or is known to have existed within a certain period before the time when these measures may come into operation, the district should be "proclaimed" as infected in the Gazette and the county papers. The egress of live cattle from a proclaimed district should be strictly prohibited, but cattle slaughtered within it and certified by the district inspector to be fit for food might be sent out of it, under proper safeguards for disinfection. Provision should be made for enabling districts which had been proclaimed to be publicly set free, on proof being furnished that all risk from infection was at an end.

This latter proposal would, if adopted, strengthen the inducements of the inhabitants of infected districts to rid themselves of the disorder, and those of their neighbours to watch vigilantly against its approach.

2. *Powers of Inspectors.*

We are of opinion that the power to seize and slaughter vested in inspectors by the Consolidated Order may properly be withdrawn; or, that, if retained, it should be exercised only in cases where the inspector's directions as to the separation of sound from diseased stock, &c., or any general preventive or sanitary regulations issued by the Government, are not complied with. This power is right and useful when the disease has appeared only at isolated spots and attacked a few animals; the public benefit is then very great, and the private sacrifice small; but in proportion as it extends, the hope of thus arresting its march diminishes, the inevitable waste increases, and the sense of hardship tends to become insupportable. In principle, a system of compulsory slaughter should be complemented by a system of compensation, and the objections to promising compensation to individuals out of the public treasury on an extensive scale appear to us insurmountable.

3. *Foreign Cattle.*

No reference has hitherto been made to cattle imported from abroad. Should our first recommendation be entertained, and an absolute embargo placed on all traffic in cattle within Great Britain, we think that imported cattle should be slaughtered at the ports of landing. We are further of opinion that cattle should be allowed to land at certain ports only, where proper facilities can be afforded for inspection and transport. In the other alternative, it will be sufficient to say that foreign cattle, if passed by the Customs' inspectors, and not coming from an infected district, may be sent by railway to any market in Great Britain, but shall be then subject to the same regulations as British cattle.

4. *Uninclosed Lands.*

During the period of prohibition, whether absolute or limited, no cattle should be allowed to be turned on common or uninclosed land.

5. *Periodical Returns.*

It is highly desirable that steps should be taken for obtaining periodical returns of the horned cattle and sheep within the area of every parish of Great Britain, and of their sanitary condition with especial reference to the present disease.

6. *Ireland.*

Before this Report is concluded some reference should be made to the peculiar circumstances of Ireland. The disease not having as yet broken out in that country, there is no necessity for the measures which have been recommended for Great Britain. It is still possible, by the adoption of suitable precautions, to avert the calamity from Ireland altogether. The importation of cattle into that country has already been prohibited for some weeks past. Considering, however, the destructive character of the disease, it will not be judicious to rely upon that precaution alone for escaping it. The evidence which has been laid before us leaves little doubt that it can be conveyed by persons who have been in contact with infected animals, as well as by the animals themselves. In case it should, by any accident, be carried over, the Government should be in readiness to eradicate it from any spot in which it may appear; and unless preparations are made for doing so before the plague shows itself, the authorities will hardly be in a condition to act with the necessary speed and vigour when the emergency arises. In Prussia, upon whose eastern frontier the disease frequently appears, a system of precautions has been adopted for stopping its further progress, which have hitherto met with invariable success. It would probably not be difficult to make provision for the application of similar measures to Ireland, and so to secure to it a permanent immunity from the calamity under which Great Britain is at present suffering. But the extreme rapidity with which the disease spreads makes it important that all arrangements for stamping it out, in case of its possible appearance, should be made without delay.

We append to this Report a short series of practical suggestions, drawn up by those members of the Commission who are professionally qualified to deal with sanitary subjects, and which may be useful at the present time to owners of cattle.

(Signed) ROBERT LOWE.
LYON PLAYFAIR.
RICHARD QUAIN.
E. A. PARKES.
THOS. WORMALD.
ROBERT CEELY.
CHARLES SPOONER.

31st October 1865.

MOUNTAGUE BERNARD.

SEPARATE REPORT

OF

EARL SPENCER, VISCOUNT CRANBORNE, Mr. READ, AND Dr. BENCE JONES.

We are unable to join the other members of the Commission in recommending the total stoppage of all movement of cattle in Great Britain. It is true, that, if such a measure were practicable, it would be more effectual than any other in extirpating the disease. But we do not believe it to be practicable. It would involve an interference with the course of trade at variance with our national habits; and it would demand sacrifices from large numbers of people, who are removed from the presence of the disease, and who will therefore not see the necessity for so stringent a measure. The sudden transformation of the enormous cattle trade by which the large towns are supplied into a dead meat trade, would involve difficulties and dangers of the most formidable kind. The foreign trade, which at this moment furnishes a considerable proportion of the meat consumed in the large towns, would also be seriously interfered with. The price of meat would, in consequence, rise materially and suddenly.

These difficulties would lead to the evasion of the prohibition. And if it is largely evaded, as we think probable, it will be worse than useless.

We prefer, therefore, the measures of a less stringent character, which are recommended as an alternative in the above Report. They demand no greater sacrifice than will readily be made to arrest the progress of so serious an evil; and therefore, we believe that they are likely to be thoroughly carried out.

In the other recommendations of the Report we heartily concur.

(Signed) SPENCER.
CRANBORNE.
CLARE SEWELL READ.
HENRY BENCE JONES.

We are of opinion, however, that store animals may be permitted to move from the farm of the seller to that of the buyer, provided they have a certificate from a Justice of the Peace acting in the district where the sale takes place, showing that they are free from disease and that they have been located for a certain time on the farm of the seller.

(Signed) SPENCER.
CLARE SEWELL READ.

31st October 1865.

SEPARATE REPORT OF Mr. M'CLEAN.

I dissent from the Report on the following grounds:

I consider that the magnitude of the calamity against which it is intended to guard, in no way justifies the interference with the traffic in cattle which the Commissioners in their Report recommend, and that the evils which would arise to the community from even a limited prohibition of the movement, or of the importation of Foreign Cattle, would far exceed the losses which may arise from the prevailing disorder.

By the last return issued by the Veterinary Department of the Privy Council Office,—which, as regards the number of animals which have died of the Cattle Plague, is correct, and although not strictly accurate in other respects may be considered fairly to represent the progress and present extent of the ravages of the disease,—it appears that up to the 21st of October 1865, a period of rather more than four months from the time when the disease first appeared in Islington, 14,083 animals had been attacked, that of these 6,711 had died, 5,119 had been slaughtered, 707 had recovered, and 1,546 remained under treatment.

The estimated number of horned cattle in Great Britain is about seven millions, so that less than 1 per 1,000 of such cattle have died of the disease in four months, or about one per day for every 116,000 head.

During the same period of four months, sound and healthy cattle of the average value of (say) 15*l.* 15*s.* per head, have been imported from foreign countries at the average rate of 1,000 per day, so that by the operation of the present system, involving careful inspection at the ports of landing, the gain to the country has been 16·6 sound cattle for each one that has died of the disease.

The growing necessities of the community in the matter of animal food, and the comparatively trifling extent of the injury hitherto inflicted by the disease, do not justify any exceptional legislation or any systematic interference by Government with the trade in cattle, a trade which, taking its position amongst the other great branches of national industry, must be subject to its own peculiar risks and liabilities.

The existing Orders in Council, enforced by the exertions of landowners, farmers, and graziers who have embarked their capital in the trade, appear to be sufficient for its protection; while by insurance or otherwise the parties interested should indemnify themselves against loss without appealing to the community to interfere for the preservation of their property by exceptional legislation.

Since the year 1750 the circumstances of the country and of the cattle trade have entirely changed, and no comparison can fairly be instituted between its state at that period and the present time.

In the year 1750 and the subsequent years of the Cattle Plague, the trade in cattle was one of the principal industries of the country, and any loss sustained by the owners was almost irremediable, as there were then no available means of importing cattle from foreign countries for supplying the people with animal food.

In 1864 circumstances were very different. In that year the computed net value of the articles imported into the United Kingdom was nearly 275,000,000*l.*, of which upwards of 40,000,000*l.* was for alimentary supply, exclusive of spirits, wine, tobacco, and other exciseable articles.

During the same year the computed net value of the articles exported was 212,656,542*l.*, making a total value of 487,520,468*l.*, while the amount of all descriptions of property and profits assessed to the Income Tax was 326,775,501*l.*, about one ninth of which was for occupation of land, and probably not so much as one eighteenth was due to pastoral occupation.

The estimated value of the property which it is proposed to protect by penal laws and quarantine regulations, to be carried out at the expense of the community and to their serious loss, inconvenience, and certain discontent, is about 60,000,000*l.*, or about one eighth of the annual value of the national imports and exports.

The importance of the cattle trade, as compared with the other branches of national industry, is much less in 1864 than it was in the year 1750, while the numbers of the people, their wealth, and means of purchasing animal food, have greatly increased.

The consumption of animal food is not now confined exclusively to the wealthy, but has become the necessary food for the working classes, and the use of it is so general, that so long as the disease can be discovered at a period when the flesh of the animal is perfectly good and fit for human food, it is impossible in this

populous country for the disease to spread to any great extent, as all beasts showing the slightest symptoms of disease would be immediately slaughtered by the owner for his own protection.

As the demand, as shown by our imports of cattle, is greater than the Home supply, there would only be partial loss when lean cattle had to be slaughtered.

The opinions expressed by witnesses of experience on the proposal to supply London exclusively with meat killed and brought from a distance, were not favourable to the plan.

It is further to be considered that any prohibition to the importation of foreign cattle would affect and derange the whole of our commercial relations and means of communication with foreign countries.

It would create distrust at home and abroad as to the safety of investing capital in establishing, by steam boats and otherwise, cheap and regular routes by means of which food is provided for the community.

It would deprive the foreigner of an important exchangeable commodity, in many cases the only one he has to offer, and possibly lead foreign Governments to impose restrictions on the export of any food from their respective countries, that might prove very detrimental to this kingdom.

The farmers of Great Britain cannot produce food enough for the people. Agricultural produce, including cattle, meat, butter, poultry, &c., to the value of more than 40,000,000*l.* sterling, has to be imported yearly from beyond the seas. Any legislation which should interfere with this supply, and the employment of the means which at great expense have been provided for its conveyance to this country, would inflict an incalculable amount of injury, and would occasion great and immediate suffering to the labouring classes, many of whom would be thrown out of work, while the price of provisions would be enhanced, and many of them now able to use animal food would be deprived of it. This would interfere with the value of labour, and with our means of competition with other countries, by increasing the cost of our manufactures.

With these facts and considerations before me, and after carefully considering the nature and extent of the present disorder in cattle, I am of opinion that it does not at present justify any further restriction in the movement or trade of cattle, and that the powers now vested in Her Majesty's Privy Council are sufficient to prevent the spreading of the said disorder, and to avert any future outbreak of it.

(Signed) JOHN ROBINSON M'CLEAN.

31st October 1865.

SUPPLEMENT TO REPORT.

Sanitary Recommendations.*

On the subject of preventive and medical treatment the Commissioners have received, both from this country and from abroad, discouraging but decided evidence that all methods hitherto adopted have been found unsuccessful. Nevertheless, being of opinion that medical science may still be able to discover agents capable of mitigating the virulence of the malady, the Commissioners have drawn up a scheme of investigation into the nature of the disease, and have entrusted different enquiries to scientific men of great skill and ability, who will make reports on the subjects entrusted to them at the earliest possible moment.

In the meantime a few sanitary suggestions may be offered which are calculated to be useful to farmers and dealers in cattle. These may be divided into the following heads:

I. The general precautions which should be taken by cattle owners to prevent the spread of the disorder.

II. The special precautions required when the Plague is in the neighbourhood.

III. The measures, preventive and remedial, which should be taken when the Plague breaks out in a locality.

IV. Measures for disinfecting sheds and cattle which have been infected.

I. *General precautions to prevent the spread of the disorder.*

1.—As no successful plan of treatment has yet been proposed, the owners of cattle must, in the meantime, rely chiefly upon those hygienic measures which the experience acquired in other diseases show to be important in preventing the spread of contagion, and in diminishing the intensity and area of an attack, when, in spite of such measures, they invade a locality hitherto uninfected. In the case of the Cattle Plague it is certain that no sanitary precautions can prevent the spread of the disease when it is actually introduced; still, from analogy, we may draw the conclusion that some effect may be produced on the rapidity of the spread, or on the virulence of the disease, by placing cattle in the conditions most favourable to health.

2.—With this view it is important to secure strict cleanliness, good drainage, efficient ventilation, and to prevent overcrowding in all cattle sheds and cowhouses. No accumulations of litter fouled by the voidings of animals should be permitted in, or even close to, the houses or sheds in which cattle are kept. Chloride of lime, carbolic acid, or the powder containing carbolate of lime and sulphite of lime should be used. The latter is probably the best; it contains a well known disinfecting substance which is formed when sulphur is burned, and also a strongly antiseptic material, kreasote, from coal tar. The sheds themselves should be swept and washed daily, and sprinkled with disinfectants. But such purification of the air of cattle sheds or houses will be insufficient to preserve health if the cattle be overcrowded. Pure air and nourishing diet are of great importance in protecting animals from the attacks of disease. Pure water, derived from sources uncontaminated by drainage from surrounding dungheaps, or from the absorption of vitiated air which hovers around them and in the sheds of cattle, is equally essential.

Every farmer should look to the housing of his cattle in the present emergency, as he would look to the housing of his own family, if cholera or other formidable disease were in his neighbourhood. Thorough cleanliness of the houses, good drainage, freedom from evil smells, nourishing diet with pure air and water, cannot give immunity from the disease, but they may offer obstacles to its propagation.

II.—*Special precautions necessary when the disorder is in the neighbourhood.*

Whenever the Plague is known to be in the neighbourhood, or to be approaching it, the following conditions must be borne in mind:—

1. The natural voidings of a diseased animal, as well as the discharges which come from its mouth, eyes, and nose, during the progress of the disorder, can be carried by men and animals so as to infect sound cattle, and in this way the disease is often

* Suggestions in the sense of many of these recommendations have been already drawn up by Professor Simonds and by Dr. Thudichum for the Privy Council, and have been circulated.

propagated. A farmer should therefore at once give orders that none of his own labourers should go near infected beasts, and that none of the labourers working on the farm where there are diseased cattle should approach his stock. Even when veterinary surgeons visit cattle affected with the Plague, they should, if they have been with diseased beasts, first thoroughly cleanse their clothes, wash their hands with a solution of chloride of lime, and rub the soles of their shoes with disinfecting powder.

2. Both sheep and dogs can carry the seeds of the disease, so that they should be carefully looked after, lest, in having access to diseased cattle, they may attach to themselves portions of excrement or discharges, and communicate the contagion to sound cattle. The farmer will do well to recollect that both sheep and goats take the Plague in a virulent form, although they are not, perhaps, quite so susceptible to the influence of the contagion as horned cattle; but even when they do not take the disorder, the wool of the sheep and the hair of goats can long retain the morbific matter, and then transfer it to cattle.

3. The particles of the poison can be drifted by the wind to some distance, experience having shown that a space of considerably more than a hundred yards affords no protection; therefore, if a farmer has the opportunity, he should remove his stock to the furthest possible distance from that of his infected neighbour.

4. If a farmer have reason to think that some of his beasts may have been near infected animals, he should at once wash them over with the solution of disinfecting soap or with a tepid solution of chloride of lime, carefully sponging out the nostrils and mouth so as to remove all portions of discharges which may have been collected.

5. He should vigorously attend to the hygienic measures described in the last section.

III.—*Preventive and remedial recommendations when the Plague has attacked a locality.*

1. Should, unfortunately, the Plague reach the farm or cowshed, it will be the cattle owner's duty to separate without delay the diseased from the sound stock. At once, and before any symptoms of the malady have appeared in the animals which may have been in contact with the diseased beast, he should place them in roomy, well cleansed and dried, well aired and disinfected sheds, having previously washed their bodies with water containing disinfecting soap, or with a tepid solution of chloride of lime; he will thus place them in the best condition to resist the further spread of the disease. But if he do not possess the necessary accommodation for the removal of the healthy animals, he ought, after separating the diseased beast, to make a thorough disinfection of the house or shed, in the manner to be described afterwards, before he permits the sound stock to remain in it.

2. The sick beast, if allowed to remain alive, should be well rubbed down and thoroughly cleansed, be kept in a warm but well-ventilated and clean shed, and be covered with a clean horse-rug. The animal will thus be put in a favourable condition to receive such curative treatment as the veterinary surgeon or farmer may consider it expedient to employ.

3. Having failed to obtain any assurance of the existence of effective curative methods, the Commissioners only venture for the present to indicate some general suggestions as to diet and treatment, which may be useful to farmers.

(*a.*) *Kind of food.*—One of the early symptoms of the disease is that the appetite fails and rumination ceases. When a dissection is made of an animal that has died of the Plague, the stomachs are usually found to contain from one hundred to two hundred pounds of undigested food. This mass of matter interferes with the functions of nutrition in the case of new food, and, further, hinders the action of medicine which may be administered, by greatly retarding its absorption. As soon, therefore, as the beast shows the early symptoms of the disease, its ordinary food should be changed; and, as rumination has stopped, the dry food should be replaced by warm liquid stimulating mashes given in moderate quantity.

(*b.*) *Warmth of the air.*—It is stated that the temperature of the air of the stall should be kept warm; probably not lower than 60° Fahr.

(*c.*) *Warmth to the skin.*—It is desirable to keep the skin of the animal as warm as possible, and if it can be done, to promote perspiration. Without expressing any decided opinion as to the exact efficacy of steam or hot-air baths, we yet believe the evidence is sufficient to warrant a fair trial of these measures.

(*d.*) It is important to lose no time in beginning the treatment of the complaint with salines or diaphoretics, or even stimulants, according to the judgment of the veterinary surgeon as to the state of the disease. Every hour that is lost lessens the chance of a successful result. After cattle have been exposed to infection, some veterinary surgeons

consider it useful to give saline and febrifuge medicines at once, even though it is not certain the animal has taken the disease.

(*e.*) When diarrhœa occurs, there seems little doubt that it should be controlled, and not encouraged.

(*f.*) The animal must be supported as much as possible by very nutritious food.

(*g.*) Milking cows should be regularly milked as long as any milk can be got. The milk, of course, should not be used as food.

The general diffusion of the disorder through the system leaves little hope that any local treatment is likely to prove effective.

When the animal shows signs of convalescence, it should only be very gradually restored to the dry food requiring rumination. It may be treated with moderate stimulants and tonics, among which bark and iron are considered to be the most efficacious.

IV. *Measures for disinfecting infected sheds and cattle.*

1. When animals attacked with the Plague have become convalescent, they ought to be kept apart from sound beasts for three weeks, and even then not be permitted to associate with them till they have been washed and disinfected as described previously.

2. During all the time that animals suffer from the disease, the litter fouled by them, with the dung and discharge on it, should be burned, and not be allowed to mix with other manure. It contains the poison in a concentrated form, and it is questionable whether it can be disinfected efficiently.

3. The sheds in which the diseased animals have been must be thoroughly purified and disinfected. The roof and walls should be washed with lime. The floor and woodwork, after being thoroughly washed with water containing washing soda, should be again washed all over with a solution of chloride of lime, containing 1lb. to a pailfull.

4. The hides and horns of animals which have died of the disease ought to be buried with the animal, according to the Orders in Council. But the hides and horns of those which have been killed to escape the spread of the infection must be dipped in, or thoroughly mopped all over, and, in the case of the hides, on both sides, with water containing 4 lbs. of chloride of lime to three pailfulls of water. Unless this be done with care a most fertile source of contagion will be preserved.

5. The attendants upon diseased beasts should not be allowed to go near the sound animals in the same farm.

6. Every one who has had the Plague in his premises should feel the responsibility which rests upon him to destroy, by careful cleansing and disinfection, every trace of the disorder which may be left on his pastures or stalls, or on his cattle, their horns, hides, manure, and litter. Under favorable circumstances for its preservation, the contagious poison has been kept, with all its virulence unimpaired, for many months. Unless, therefore, each person uses his utmost effort to extinguish the seeds of the Plague which lurk about his farm, they may become a centre of contagion, which will again spread it abroad through the country, and render unavailing the sacrifice necessary for the speedy suppression of this terrible scourge.

MINUTES OF EVIDENCE.

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MINUTES OF EVIDENCE

TAKEN BEFORE

THE CATTLE PLAGUE COMMISSIONERS.

Monday, 9th October 1865.

PRESENT :

Earl Spencer.	Dr. Parkes.
Viscount Cranborne.	Mr. M'Clean.
Mr. Lowe.	Mr. Wormald.
Dr Lyon Playfair.	Mr. Ceely.
Mr. Read.	Professor Spooner.
Dr. Quain.	

EARL SPENCER in the Chair.

Professor James Beart Simonds and Mr. William Ernes examined.

Professor J. B. Simonds and Mr. W. Ernes.

9 Oct 1865

1. (*Chairman.*) (*To Professor Simonds.*) You are a member of the Veterinary College of London ?—Yes.

2. Have you been employed by the Government with regard to the cattle disease ?—I have.

3. Have you had the means of studying the disease on some previous occasions ?—I have had an opportunity of studying the disease in Galicia, which now prevails among cattle in this country.

4. Will you state to the Commission the result of your visit to Galicia ?—Accompanied by Mr. Ernes I, after having inspected the ports of Holland and other places from whence cattle were exported to England, went on to Berlin and from thence to Cracow, before seeing or hearing very much of the disease. When we got to Cracow we had an interview with Count Clam-Martinitz, and received instructions to go on to Lemberg, to investigate the malady.

5. When did you make this visit ?—I think that it was in the year 1857. Perhaps you will allow me to refer to the report which was written on my return, and I shall then be able to ascertain the precise date. We left London for Belgium on the morning of the 9th of April 1857.

6. What was the cause of your going on this expedition ?—It was in consequence of information which had reached the Government through the consuls, particularly from the consul residing in Lübeck, of the existence of the Rinderpest in Mecklenburg, and its steady advance towards the parts from whence we were importing cattle.

7. You were sent by the Government to make a report upon the subject ?—I was sent not expressly by the Government ;—the three national Agricultural Societies of England, Ireland, and Scotland resolved that some person should go out to see the state of things, and they determined upon nominating myself with Mr. Ernes to that position, and we had the protection and assistance of the Government. We had letters of introduction to some of the Consuls from Lord Clarendon, who also wrote to the representatives of the British Government abroad.

8. Will you state what occurred on your journey, and what you saw ?—Would it be the wish of the Commission that I should state what we observed with regard to the countries which we passed through ?

9. Anything relating to the cattle disease.—It will suffice to say that we visited Belgium, Holland, Westphalia, part of Denmark, Schleswig and Holstein, Hanover, Mecklenburg, Prussia, and Silesia, and that we saw nothing of the disease until we arrived in Galicia. We found a considerable amount of disease existing in some of these places, but the disease was the one known in England by the term pleuro-pneumonia. It was this disease which had attracted the attention of the consul at Lübeck, and which led to our going out. When we arrived in Galicia, or rather in Cracow, we had an interview with Count Clam-Martinitz, and received instructions from him to go on to Lemburg.

10. Who was Count Clam-Martinitz ?—He was the representative of the Austrian Government for that portion of Austro-Poland. We had made the acquaintance of Professor Nicklas at Berlin on our way to Cracow, who was professor of the Munich Veterinary School, and who had been sent by the Bavarian government on a similar mission to ourselves. Professor Nicklas had an interview with Count Clam-Martinitz on the day previous to ourselves, and the instructions he received from Count Clam-Martinitz were to go to a place called Sandec, being about 150 English miles south-east from Cracow. We, however, were instructed to go to Lemberg, being about 500 miles in nearly a direct easterly line from Cracow. We thought it strange that we should be instructed to go to Lemberg, and he to Sandec, but there were reasons which afterwards appeared explaining this circumstance, and when we saw Professor Nicklas after the interview with Count Clam-Martinitz, we arranged that he should go on with us to Lemberg, after we had been to Sandec, in the event of such being necessary, We went to Sandec, and within a short distance of that place came up to the disease, and had every opportunity of observing it and studying its pathology.

11. Will you state the kind of cattle which were affected in pastures, and whether they were housed or feeding ?—The first cattle which we saw were some belonging to a farmer and distiller residing in a place called Kamienica ; the animals were at a farm of his, a few miles distant from where he resided. On that farm we saw all the animals he had, which were in quarantine upon the farm ; they were therefore not at pasture. In the sheds also there were four steppe oxen, three of which had recovered and one of

Professor J. B. Simonds and Mr. W. Ernes.

9 Oct. 1865.

which had escaped the malady. The disease was introduced into his farm by his purchasing some cattle at a fair some distance from the place. The animals had taken the disease, which was incubated in their systems at the time. On their arrival some of them were sent on to Kamienica whilst others remained on his farms. The disease declared itself in both lots of cattle, and it quickly spread from the steppe cattle to the others. The whole of the details are given in the Report of our mission.

12. What was the number of the cattle on this gentleman's farm?—If your Lordship has a copy of the Report and will turn to page 50 you will be enabled to follow the statement. I there report that "It was somewhat singular that at Zabrzez we came "upon the identical farm where the malady had first "showed itself in this locality, and saw on the "premises four of the original Steppe oxen by which "it had been brought. Three of these had been the "subjects of the disease, but had recovered, and the "fourth had resisted the contagion throughout, as "was believed, because he had before been affected. "They were tied up to fatten, and had every ap-"pearance of perfect health, having no trace of "disease of any kind about them. Besides these, "there were nine other animals on the farm in "quarantine, consisting of three oxen, a young bull, "and five cows; they also were feeding and looking "well. Twelve days had elapsed since the last "death, and we learned that should no other case "occur, the animals would not be liberated till the "completion of the 21st day from the time of the "last death." Then there were others of his animals which he lost in consequence of removing some cattle from his farm to Kamienica, and then sending them back again; there was an interchange of animals at that time which tended considerably to spread the disease.

13. In that case he lost a very considerable number?—The history of it is this that "Until the present "occasion the villages of Zabrzez and Kamienica, as "well as all the surrounding district, have been "perfectly free from the disease since 1846," a period of 11 years. "The existing outbreak took "place in the month of March, and was due to the "introduction of 10 steppe oxen which had been "purchased at a cattle fair held at Jaczmirz in the "Lemberg division of Galicia. These oxen came with "large droves from Bessarabia, and from three to "four thousand head were brought together at the fair. "Jaczmirz is about 20 German miles from Zabrzez, and "three full days were occupied in driving the animals "to the latter named place. They were brought by "M. Berl Krumholz, farmer and distiller, and arrived "at the farm on the 15th of the same month, and "after remaining a few hours were sent on to "Kamienica, where the distillery is situated. They "were here put with 14 fat oxen, but in consequence "of these arrivals being sold for slaughtering two "days afterwards the steppe cattle were returned "to Zabrzez on the 18th; here they were placed in "a stable by themselves, and stood there until the "20th, when four of them were a second time sent "to Kamienica with ten head of young stock, and on "their arrival were placed with 21 others. On the "following day, the 21st, the six steppe oxen left at "Zabrzez were observed to be trembling, which being "supposed to depend on exposure to cold they were "put into a shed for warmth, in which were 18 other "animals, consisting of some young bulls, cows, and "two calves. On the 22d the four steppe oxen at "Kamienica were likewise noticed to be unwell and "trembling, and the true nature of their illness being "now suspected they were immediately removed from "the other stock, and orders were sent to Zabrzez for "the six to be also taken away and kept by themselves. "As a further security to the stock at Kamienica, "early the next morning the four steppe oxen were "sent back to the farm at Zabrzez. Notwithstanding "this precaution, the disease broke out among the "young cattle on the 30th, and eight of them died on "the first day, and by April 3d, 31 in all were dead. "Besides these animals M. Berl Krumholz had ten "others at Kamienica, and the Commissioners de-"cided upon killing them at once, so that he might "receive something towards his loss. Thus it ap-"pears that the entire number lost by him at "Kamienica was forty-one animals, and had it not "been for the selling of the fourteen fat oxen they "also in all probability would have been sacrificed "to the disease. On the same day that the pest "manifested itself at Kamienica it also broke out at "Zabrzez among the 18 animals with which the "steppe oxen were placed on the 21st. Of the "entire 28 animals located here, including the 10 "Steppe cattle, 13 died, 11 were killed, 3 recovered, "and 1 resisted the infection entirely."

14. Was the origin of that outbreak clearly traced to those cattle from the steppes?—It was clearly traced to those cattle which were purchased at this fair, and brought to his premises by himself; he went to the fair and purchased the cattle, and had them forwarded to his farm; and there had been no disease, as your Lordship will have gathered, in the district for 11 years, that is since March 1846.

15. You examined, I suppose, into the nature of the disease?—We examined into the nature of the disease, not only on his premises, but also in the quarantine station in Kamienica, where we were located.

16. And it was a disease which you had not seen in England before?—It was a disease which we had in England in 1745, and which remained here until 1757.

17. Did your journey continue any further; did you visit the steppes?—We did not go to the steppes of Russia; we did not think it necessary to do so, nor did we, after the satisfactory investigation which we had made, deem it prudent to go on to Lemberg. We thought that we should gain no further information than that we had already obtained.

18. What were the precautions taken against the spread of the disease in that country?—The precautions were in principle these: that immediately upon the disease declaring itself on a farm, the person gave information to the local authorities, and directly the place was surrounded by a cordon, which was kept up so long as the disease existed, and until I think 21 days after the ceasing of the malady. The animals were immediately consigned to the quarantine, and communication of every sort and description was cut off. We ourselves, although left free to pass from one village to another, were not permitted to travel along the road with straw in our waggon, but had to sit upon branches of fir trees, which we broke down for the purpose. Even our waggons were kept at some little distance from the farm premises, and we ourselves were only permitted to go upon the premises. The labourers and other persons were prevented by the cordon from leaving the farm.

19. Were any attempts made to cure the disease?—No attempts whatever are made to cure the disease in that country.

20. The animals were left to the course of nature?—Except so far as this, that immediately upon the local authorities knowing of the existence of the disease, they convey the information to the Government, when a Commission is immediately dispatched, and the animals placed under the care of the Commission to deal with as they deem best. They occasionally allow some of the animals to remain alive for a day or two, but when they find that the disease is progressing they slaughter the remainder of them, and bury them with those which had already died of the disease.

21. Then the animals were slaughtered by the order of the Commissioners?—Yes.

22. Were precautions taken with regard to the skins and carcases of these animals?—On the farm in question the skins were allowed to be removed from the animals, and were disinfected under the

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uperintendence of a proper officer appointed by the Government; but in other parts the general rule which prevails is that they bury the animals with the skins on.

23. Were there any regulations with regard to the inspection of cattle coming into the country?—I think not; there was no general measure with regard to inspection. Immediately, however, upon the pest being known to have come into Austria or Prussia from Russia, a prohibition of animals coming from that country, either into Austria or into Prussia, as the case might be, would be enforced.

24. You are not aware of any inspection at the markets, or where cattle congregated?—None whatever; in fact there are no veterinary surgeons there, and scarcely any competent persons to examine cattle. The Commission consisted of one medical gentleman and a person associated with him who was acquainted with the details of the law.

25. Did you visit any other parts of the continent where you found the disease?—We found no disease excepting in this immediate district. We ascertained its existence in other parts of Galicia; but we did not go to those parts. I may remark that in Kamienica we had every opportunity of observing animals which arrived in the quarantine station day by day; and we also purchased an animal in order that we might the better study the pathology and progress of the disease. Subsequently, however, cases kept occurring day by day, which afforded us therefore ample opportunity of carrying out our mission.

26. You have spoken of the quarantine station; what is that quarantine station?—In the village of Kamienica the animals were very poor, and they were placed in a temporary building which was built with fir trees, with the branches of a tree thrown over the roof, just sufficient to protect the animals from the coldness of the weather, or from the heat of the sun in the middle part of the day. That was the quarantine station into which all the cases were removed as they occurred.

27. From the different farms?—From the different farms.

28. What sort of land was it; was it healthy pasture where these animals were?—Very much of the land may be taken to have been in a state of negligence, so far as cultivation was concerned, being scarcely cultivated at all, for want of implements. It was growing couch grass as large as the stem of an ordinary quill, and in the month of March you could easily have removed this from out of the land quite clean with ordinary tillage. This will give you some idea as to the quality of the land. The land itself unquestionably was good, but it was altogether uncultivated.

29. Would you consider it a healthy pasture for cattle?—It was a healthy district as a rule, but we were in the very poorest part of Galicia. Count Clam-Martinitz had no wish that I, as an Englishman, should be sent there. The greater part of the people had scarcely any money or food or clothes; the poor women could be seen with nothing but a skirt to cover them, washing the couch grass in the mountain stream, to give their cattle, and the animals were in the most starved condition possible. Those, however, belonging to the distillery which I have spoken of were very good animals, and very well kept.

30. (*To Mr. Ernes.*) You are a member of the Veterinary College in Belgium, are you not?—I am not a member of that college, but I have studied in Belgium, and I have studied at Alfort, and at Munich in Bavaria.

31. Have you practised much as a veterinary surgeon?—I am a member of the Royal College of Veterinary Surgeons in England, and I have practised more in England than in any other country. I have practised for 25 years at the present address.

32. Have you anything to add to what Professor Simonds has stated?—Nothing. I was with him all the time; there is nothing to be added or corrected. What he has said is a correct statement of what we then saw.

33. There is nothing more which you then saw which you think valuable as information to the Commission?—No. The clear importation of the disease was from the steppes; that fact had been established. Another fact was that no remedial means were adopted, they considering that it was dangerous to undertake the cure; their expression was that while curing one animal you might infect fifty, and perpetuate the disease.

34. Were there competent people to treat the disease?—There were no means in that district, but in other parts of Austria there are means, but they do not adopt any curative remedies. We ascertained that about 90 per cent. of the cattle generally died; that was the information which we obtained on the spot. A great deal of our information was obtained in Vienna, on our return, however, from Professor Röll, who is a man well versed in veterinary science, and has also had great experience in the Rinderpest or Cattle Plague.

35. Were the means to prevent its spreading generally considered effective?—They are not so effective in Austria because they are not so strictly observed, but in Prussia they are very effective. There, as soon as the plague breaks out in a certain spot, it is surrounded by a military cordon, and they instantly slaughter all the cattle. At Breslau we were informed by Baron Siblûnitz, Governor of Silesia, that there had been one outbreak in that province. It was imported by a carpenter, who surreptitiously passed the frontier cordon from Galicia, where the Rinderpest prevailed at the time. He incautiously mended a manger in his father's cowhouse; a few days after, the malady broke out in the cowhouse. Due notice being given, the place was sequestrated by the cordon, the cattle were killed, and the further spreading of the pest prevented.

36. Are you acquainted with the existence of the disease in any other country besides Prussia and Austria?—I cannot say that I have a very great acquaintance with it, but in 1814, 1815, and 1816 I saw something of the disease. I was then very young, but I saw enough of it to have an acquaintance with it, and to know what it really was, and afterwards, by conversation with different French and Belgian professors who had treated the disease, I got a good deal of information upon the subject, and when we were sent to Galicia that information availed us very much to trace the disease.

37. Is it your opinion that the disease does not break out spontaneously?—It is decidedly my opinion, and I believe that that is confirmed by a great many authorities. Professor Renow, who investigated the disease, clearly establishes that it has never broken out spontaneously in any country except in the steppes, and I believe that we have evidence that it is in the Asiatic part of the steppes where the disease originates, not the European parts, though there it is generally quite as bad or worse than in the Asiatic, but if a line were drawn between the Asiatic and the European steppes, in the opinion of the German and and Russian professors of veterinary science, it would never come further than that. Although it is now affecting, I believe, Hungaria and the Danubian provinces, which for 25 years have not been free from it, it is not indigenous there, but it is imported by the steppe connection. The difficulty is to know whether it resides in the breed of cattle itself or in the geological position of the country, but the opinion is that it is particularly in the marshy part of the steppes; those valleys of the two rivers, the Volga and the Don, seem to be the centre of the disease.

38. There has been no attempt to inspect any of the cattle coming from the Asiatic steppes?—It would be very difficult, because there are not less than perhaps from 8,000,000 to 10,000,000 cattle going from one place to another. When they have devastated their grazing in one part they move further on; it has been stated many years ago that 100,000

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are generally found on the roads coming to Perikop, Bessarabia, and Galicia, at one time, and the disease often breaks out among them while on the road. They might come from the steppes free from the pest, but in travelling bad roads it breaks out among them, and it spreads as they go on.

39. Has your attention been called to the murrain which has existed among the cattle in Egypt; is that the same disease?—The murrain which broke out in Egypt in 1841 was the Rinderpest, and it was clearly traced to cattle bought by the Pacha of Egypt and other rich proprietors in Annatolia and Karamania, in the winter of 1840 and 1841. They were shipped in Adana and Tarsau; but before their embarkation a great number died of an epizootic, which broke out amongst them. Instead of abandoning the rest, they hurried the embarkation: more died on the transit. The remainder arrived at Alexandria in the spring of 1841, were sent hurriedly up the country with a view to stay the malady; but they soon spread the Plague, which lasted until 1845. This was the Rinderpest. There is another disease which affects the cattle coming from the fertile districts of Nubia, of which Egypt draws large supplies of cattle, but its character is dysentery caused by the privation on the roads, but it is not contagious.

40. That is what they suffered from so severely two years ago?—Yes, and Italy suffered two years ago from the same pest, and then it was clearly traced to cattle which had been brought from Austria to Trieste, and from Trieste the plague spread over nearly the whole of the south of Italy.

41. (*Dr. Parkes.*) (*To Professor Simonds.*) With respect to the quarantine in Galicia, you say that 21 days' quarantine was imposed?—Twenty-one days subsequently to the killing of the last animal. The animals are taken possession of as quickly as possible, and they are confined in quarantine for a certain time. We will presume that there are 10 or 12 animals in the quarantine station; deaths occur probably day by day; the Commissioners slaughter the animals which live on, and they keep up the quarantine with all its rigour for 21 days after the slaughtering of the last animal.

42. You are referring to 1857, is that still the case?—Yes.

43. Some of the Russian parties have attempted to shorten the period of quarantine, thinking the 21 days too long. What is your own opinion as to the period of quarantine?—I think that it would be very dangerous indeed to shorten the period of quarantine to 10 days. Mr. Ernes attended at the Congress, held only a month ago at Vienna, and the question was there discussed, and a division took place; some were for 21 days, but the majority were for 10 days, —they did not want to interfere too much with the trade in cattle.

44. I did not quite understand the plague in Southern Italy two years ago to which you alluded to, it was the rinderpest, was it not?—*Mr. Ernes.* Decidedly so.

45. (*Mr. Read.*) (*To Professor Simonds.*) Do the foreign governments grant compensation for the cattle which they have slaughtered?—Yes; speaking generally, they do. In Galicia we witnessed the proceeding with respect to the animals which the Government had determined to kill. The animals were brought out of the quarantine station, and held so that they could not escape, and a jury of three persons with the mayor or burgomaster of the place was summoned to put a value upon them. These persons stood at a considerable distance, just within hearing distance, and they asked those to whom the animals belonged the age of the cattle, what they had cost, and whether they were in milk, and other questions of that kind, to enable them to arrive at a satisfactory conclusion as to their value. When this information was furnished,—the whole matter being taken note of by the Commissioners,—the valuers signed their award, and the animals were immediately slaughtered. I believe that the Government paid in this instance two thirds of the value.

46. Did you discover any difference in the mortality between the fat cattle of the distiller and the lean cattle of the peasants?—We had no opportunity of coming to any conclusion upon a point like that, because the fat cattle belonging to the distiller had been sent away before we arrived; they were only store stock which he then had, with the exception of the four steppe cattle which were being fattened.

47. We will not say fat cattle, but those in good condition and others half starved?—The mortality was quite as great in one instance as in the other.

48. Do you know whether there was any truth in the report that during the Crimean war the rinderpest was introduced into Turkey? — During the Crimean war the disease existed in the Crimea, and it proved very destructive indeed both to the cattle which were brought together for the use of our army, as well as for the use of the French army. There are some particulars in this report upon that point: "It has been said that the French army lost " in Samsoun 8,000 beasts out of 17,500 in the space " of nine months, and that we" (that is, the English section of the united army) "lost during the same " time 4,000 out of 10,000 from the pest."

49. It, I believe, has generally followed in the wake of an invading army?—Yes, particularly the Austrian army and the Russian army.

50. You attribute its progress now more particularly, perhaps, to the ramifications of commerce?—Yes, to commerce, and not to war.

51. (*Mr. Ceely.*) You have stated that the term of quarantine has been 21 days after the death or slaughter of the last animal. Are there any facts to show how long after the convalescence of an animal it is considered safe to let it mingle with others?—I do not think that there are any facts which will show that, but it is a very important subject.

52. The quarantine seems to apply to the death or the destruction of the animal?—Yes.

53. It appears to be a fact of very great moment to ascertain how long the animal retains the infection after the discovery of the disease?—*Mr. Ernes.* It was decided at the Congress of Vienna that a quarantine of 10 days after the recovery of the animal affected, or after any animal being exposed to the infection, would suffice, and the result of that would be to establish a period of 11 days. I urged with Professor Spooner the impropriety of so short a quarantine, but we were outvoted by the Austrians, the Bavarians, and the Russians. They said that it had never been known that an animal had caught or circulated the disease after nine days, that that was the longest period of incubation which had been known.

54. After recovery?—After recovery, or after having been exposed to the infection; they said that incubation was never longer than nine days. That also had reference to an animal which had recovered from the disease. They said that if 10 days were allowed, the owner of the cattle might have them removed from the quarantine, and disposed of them. The recommendation of the Veterinary Congress is 10 days.

55. (*Mr. Wormald.*) (*To Professor Simonds.*) Was there any particular mode of feeding which the farmer adopted at Kamienica?—The animals were fed to a considerable extent upon grains from the distillery; the animals upon the farm were fed from the ordinary farm produce.

56. Were those grains in the same condition as usual?—I am not able to speak upon that point. There was no distilling going on when we were there, for us to observe the condition of the grains.

57. I suppose they were grains which had been kept?—I should presume from what I saw, and from the course adopted in different parts of the Continent, that they were given quite fresh, as is the case in Holland. Distillers' wash and grains are here often

given quite warm; they are pumped into receptacles, and pass on into mangers for the animals to take at once.

58. Did you ascertain whether the disease in its progress took at all the same course geographically?—No; I am of opinion that common causes have no influence whatever over the spread of this disease,—that if the disease entered Prussia for example, through Courland in the very northern part of Prussia, it would just go southward, if animals existed in that direction, or westward if animals existed in that direction,—that it would indeed travel in any direction where it found a facility for spreading according to animals being located in that direction.

59. Then it is your opinion that it is conveyed by contagion?—Decidedly so; that is to say, giving an extended meaning to the term "contagion;" it is not necessary that there should be positive contact of animals.

60. It may be mediate or immediate?—Yes.

61. (*Mr. M'Clean.*) How did you ascertain that the diseased cattle came from Bessarabia?—On the information which we had direct from the person who had purchased them himself.

62. You are aware that the distance is upwards of 300 miles, and that it is a cattle country throughout?—Yes, but we ascertained it from our examination of that person; we had him under examination for some considerable time.

63. The cattle had been driven upwards of 300 miles?—The cattle had been driven something like 300 miles.

64. And through the densest district for cattle in Galicia?—Yes, until they arrived in a district which cannot be termed the densest district of Galicia, where we found them, namely, at Zabrzez.

65. (*Professor Spooner.*) You have stated to the Commission the symptoms which you observed in those animals affected with the disease prior to death; will you state the post-mortem appearances, and what struck you as being remarkable?—The lesions produced by this disease consist essentially of inflammatory action, more or less intense, in the whole of the mucous membranes of the body. If we commence our examination at the mouth, we find that there is desquamation very frequently of the epithelium at the roof of the mouth and also of the tongue. At the fauces there is intense inflammation, with an effusion of lymph, the parts being dotted over with a yellowish white pigment. The rumen is healthy, and also the second stomach; the third stomach is affected with inflammation in patches; this inflammatory action often going on to a degree of intensity as ultimately to end in ulceration. In the fourth stomach there is intense inflammation of the villous membrane in patches, and every now and then you see spots of ulceration. In the duodenum, we also find similar indications of disease as well as in the other small intestines, particularly in patches; we observe now and then a tendency to ulceration, or that there is ulceration of Peyer's glands, but it does not appear to be an essential of the disease in its early stages. In the larger intestines similar lesions are seen to those in the smaller, and more frequently ulceration in the apex of the cœcum. The rectum may or may not be inflamed. In some cases it is greatly inflamed, while in others its mucous membrane is scarcely reddened. Looking to the respiratory system, the larynx, as a rule, is in a diseased condition. The lining membrane of the trachea often appears to be free from inflammatory action, but is covered over with layers of lymph, frequently as thin as a sheet of paper, while in a larger number of instances the trachea and bronchia contain inflammatory products mixed with frothy mucus. The lungs are free from disease, but very often emphysematous. The serous membrane of the chest, as a rule, is likewise free from disease. On the inner part of the heart, and on the left side in particular, petechiæ are present. In one or two instances in Galicia we found ulceration of the mucous membrane and of the gall bladder, and effusions of lymph into the gall ducts. The gall bladder is also very much distended with bile. The generative organs generally speaking are free from disease. The brain gives no indications of disease; but in detaching the brain from the spine we found nearly in every instance in Galicia a larger quantity of fluid than ordinary.

66. You have not seen such lesions as those on any previous occasion in diseases affecting bovine animals in this country?—Nothing at all approaching to it.

67. And those appearances corresponded with the history which you have read of the symptoms generally attendant upon rinderpest?—Precisely so.

68. (*Dr. Playfair.*) How soon were those Russian cattle observed to be diseased after they arrived at the village which you have mentioned?—I think that they were found to be diseased in about four days; they arrived on the farm on the 15th, and they stood there until the 20th.

69. They were not observed to be diseased when they arrived?—No; they were believed to be perfectly healthy.

70. In driving 300 miles through Bessarabia I suppose that it would take about 15 or 20 days?—These animals happened to have come about only 20 German miles from the fair. They were purchased at a fair about 20 miles from the place where they went to.

71. But in coming through Bessarabia, about 300 miles, they must have taken 20 or 30 days to come that distance, supposing they had come direct?—I suppose that they would take something like that time, but we know nothing of the time occupied, nor whether they came direct from the steppes to the fair.

72. But there were no means of transport such as railways to bring them very rapidly?—At that time there were no railways whatever. There is now a railway from Cracow to Lemberg, and animals could come out of Podolia and adjacent countries to Lemberg, be put upon the rail, and come direct to the port of embarkation for England.

73. At that time, in 1857, there was no railway?—In 1857 the railway terminated at a place called Bochnia.

74. How far is that from this village?—About 200 miles.

75. Would cattle travel about 20 miles a day without risk, or is that too much?—Twenty miles I consider quite far enough for animals to travel in one day; they occupied three days on the journey, as nearly as we could make out. If I may be permitted on the next occasion I will bring with me a map which I have of Galicia, on which I have the place marked where the fair was, and also that to which the animals were taken.

76. Taking the least estimate it must have been 15 to 20 days before the cattle communicated that plague from the time at which they came from the steppes?—It is not improbable that they might have received the disease on the journey, or they might have received the disease at the fair.

77. Was the disease in any other part of Galicia at the time?—Yes; there was disease in the neighbourhood of Cracow. When we were at Cracow we saw the cordon marked by pieces of stick being put in the ground, and straw placed on the top of them. The railway passed through the cordon.

78. Then you do not think that this disease was necessarily imported directly from the steppes, but it may have been disease acquired in the country at the time?—I think it is very likely, presuming that the animals had come direct from the steppes, but of which I have no evidence, that they might have brought the disease from the steppes, still it is not at all improbable that they might have received the disease on the journey. The disease exists almost continuously in those districts.

79. Was it clearly ascertained that in this case, which you have specified, the disease came direct from the steppes?—We could not satisfy ourselves further than we did, namely, that steppe cattle had

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been sent to this fair, and that some of them had been bought by the person alluded to, and that in those animals the disease was incubated at the time at which he bought them. That was all that we could ascertain.

80. That it might have arisen from them ?—It did arise on the premises from them.

81. You have stated that you thought 10 days were not sufficient, but that 21 days were sufficient; and it was with reference to that question that I wanted to see whether that period had been enough to prevent the transfer of the disease. It seems that there must have been 15 to 20 days at least, before the animals communicated the disease, if they brought it directly from the steppes? — My opinion with regard to this disease is that it is not safe to allow any animal coming from an infected district to go with another in less than 21 days.

82. Do you think that with 21 days it would be really safe ?—I would not say that; but not less certainly.

83. But the general experience of the veterinary surgeons in Austria and Prussia is that 21 days is sufficient ?—Yes.

84. (*Mr. Lowe.*) (*To Mr. Ernes.*) You said, I think, that you were familiar with the Rinderpest in 1814 and 1815 ?—In 1814, 1815, 1816, and 1817, we had it.

85. Where ?—In Belgium, Holland, and France; it came in the wake of the Russian and Austrian armies. It first broke out in the eastern part of France, in the wake of the Austrian army, and in the northern provinces of France, Belgium, and Holland, in the wake of the Russian army.

86. Could you trace the origin of that pest ?—We traced it clearly to the introduction of Russian and Austrian cattle.

87. Can you tell us how long this disease has been existing in the steppes ?—It is clearly described as far back as 1,000 years, in the time of Charles the Great, there we have the first clear description of it. We afterwards do not have so good a description of it until 1711. In 1711 it was closely studied by the veterinary surgeons and the medical gentlemen.

(*Professor Simonds.*) In 1514, and also in 1599, beef and veal were forbidden by the Council of Venice to be eaten, in consequence of this disease.

88. Where do you get those statements ?—Particular information relating to this disease is very much scattered, but there is a work written by a Mr. Mills on cattle, which contains a fair history of the malady. I do not think that Mr. Mills was a veterinary surgeon or a medical man; but he has compiled a great deal of useful matter on this and other diseases of cattle.

89. Historically ?—Yes; and so has Mr. Youatt in his book on cattle. There is also a work by Mr. Layard which is especially appropriate on this disease. From these sources and various others I have been able to acquire much information.

90. Is the disease in permanence on the steppes, or does it come and go ?—(*Mr. Ernes.*) It is in permanence on the steppes. They are never free from it. Sometimes it breaks out more and sometimes less, but it is not so fatal to the steppe cattle as to the others; and they sometimes have it in so mild a form that it wants a great deal of knowledge of the disease to perceive it. But whenever cattle come out of the steppes, to the Crimea or Bessarabia, the disease very likely breaks out on the road, and they spread it as they go along. The disease seems to be spontaneous with the steppe cattle, but it has never been known to be spontaneous with any other cattle.

91. Is it your opinion that the journey aggravates the disease ?—There is no doubt about it. One of the professors of Berlin (Spiniola) studied that subject very extensively, and went into the steppes themselves and Bessarabia, where he got all the information, and I quote from his book. There are other works upon the subject.

92. I suppose that you went to Galicia with the exact type of the disease in your mind ?—Yes; we were informed by a professor in the school of Prussia that it was of no use going northward, but that we must go to Silesia, and we were told to go on to Galicia, and were given letters of recommendation to the Governor of Cracow.

(*Professor Simonds.*) Lord Augustus Loftus also gave us an important official communication at Berlin, and we had a distinct statement from Baron Manteuffel that Prussia was then free from the disease.

93. Did the disease which you found in Galicia correspond exactly with the type of the disease which you had in your mind ?—(*Mr. Ernes.*) It corresponded exactly with the notion which we had of it.

94. Was there any variation ?—There were slight variations, sometimes nervous symptoms were not so strong, and at other times the symptoms were stronger than we were aware of. I had not seen the nervous symptoms so strongly marked in the cattle of 1814, 1815, and 1816; but then I was young, and only studying.

95. Substantially it was the same thing ?—Yes.

96. Do the sheep in those countries have the disease ?—Up to the present time we have not found anything among sheep, but Professor Seifman and other professors, one in Bohemia, have observed it in sheep; it has been observed in the sheep and goats of Sicily.

97. (*Viscount Cranborne.*) Had this disease actually broken out at the Jaczmirz fair ?—The cattle as they went left traces of it on the road; there were two or three places where the disease had broken out where these cattle had sojourned.

98. These special cattle ?—Yes.

99. These 18 ?—Yes, these 18 which were bought.

100. The disease broke out after these cattle had stayed there ?—Where they stayed they left the infection.

101. But did you hear of any disease at the fair itself, or in the neighbourhood of the fair ?—At the fair itself there was no disease.

102. What was the nearest point at which the diseases was actually raging at the time of the fair ?—We had no evidence upon that point; but still it was stated by the documents in the hands of Count Clam-Martinitz that it was on the road from the fair.

103. Behind the fair did you know anything of the parts where the rinderpest was raging ?—No; I fancy that the fair was very close to the Russian frontier.

104. How far was the fair from the place where the Rinderpest was indigenous ?—(*Professor Simonds.*) Some considerable distance.

105. Have you any evidence to connect these cattle with the districts where this Rinderpest was raging ?—(*Mr. Ernes.*) None, except that they were steppe cattle, which are very distinct from any other cattle; and it is generally admitted by veterinary surgeons and medical man, that the steppe cattle carry the germ of the disease, and that it might break out spontaneously in them.

105*a*. Without any limit of time whatever ?—I am not sure how long it might be carried in the system of the steppe ox; but that he carries the germ, and is subject to spontaneous outbreak of the malady, which has not been the case up to the present time, was confirmed at the recent International Veterinary Congress at Vienna, where I attended with Professor Spooner and others. The opinion is, that the steppe cattle carry the germ of the Rinderpest, that it may break out spontaneously in the steppes and on the road when out of it, and that it frequently does so break out, by which they infect whole districts.

106. Has that been generally known to the Government along the frontier ?—I cannot speak from experience on that point, but that is the general opinion of the professors in Germany and Russia.

107. And you say that this rinderpest is raging every year in the steppes ?—More or less every year.

108. Do these fairs, such as that at Jaczmirz, go on every year ?—The steppe ox when fattened on the

herbage of the steppes is removed from the steppes, and we are informed that 100,000 are conveyed from the steppes through Bessarabia, the Crimea, Galicia, and to the different fairs in these countries.

109. Are no precautions taken at the frontier to prevent those animals which are likely to spread the disease from passing it?—Only when it is known that the Rinderpest prevails in some districts where the cattle came from; then there are quarantines of 21 days. But it was decided by the late congress that a permanent quarantine should be established of 10 days, between Austria and Prussia on the one side, and the Danubian principalites and Russia on the other.

110. According to your opinion 10 days' quarantine is useless?—I am of opinion that it is not sufficient; but those who have more experience than we have say that 10 days is sufficient, and that if it was a longer quarantine it would impede the traffic in cattle.

111. But these particular animals had a 30 days' quarantine from the time when they left the steppes?—They might have had the disease when they were on the other side of the frontier.

112. But I understood you to say that when they were bought they showed no signs of the disease?—That of course was not satisfactorily established; they might have had signs of the disease when they came to the fair.

113. The signs of the disease are not ascertainable by ordinary persons, but only by skilled veterinary surgeons?—By skilled veterinary surgeons who have seen the pest before. Those veterinary surgeons who have never seen the malady would not be able to detect it at first; it might prevail, and it is sometimes too slight, that even a professional man might overlook it.

114. Then it would not be safe to entrust any but skilled persons with the power of killing oxen or cows supposed to be affected with this disease?—That is the opinion of the German and also of the Russian Governments.

115. Were the Commissioners who were sent in 1857 by the Austrian Government persons familiar with the rinderpest?—Yes; decidedly so. In those poor districts the surgeon and veterinary surgeon are combined. At the Vienna Institute every surgeon also studies veterinary science, and in those poor districts the two are combined, and the surgeon in question was one of those persons; he had studied veterinary art at the institute of Vienna, and consequently he was appointed as Commissioner, and he was well acquainted with the disease.

116. You have spoken of the system pursued in Prussia; are all surgeons equally well educated for veterinary purposes in the frontier district of Prussia?—In Prussia the surgeon and veterinary surgeon are distinct; not so in Austria, where the two are often combined. Prussia stands very high. Professor Hertwig is one of the first men in his profession.

117. According to the system in Prussia, as I understand you, whenever the disease is detected in any district the whole of the cattle in that district are slaughtered?—Yes.

118. How large is that district thus condemned?—It might be only a farm or perhaps a whole village that is infected; a cordon is formed round it; nothing is allowed to go, and all the cattle are slaughtered.

119. Is that always done on the authority of a veterinary surgeon?—Yes; it is on the authority of an inspector, and by the authority of the Government, and a certain compensation is made to the proprietors.

120. You stated, I think, that the disease was 1,000 years old; have you any accurate details of symptoms from those early times?—Professor Simonds has perhaps investigated the history more than I have. I do not exactly know what were the symptoms in the time of Charles the Great.

(*Professor Simonds.*) There are no symptoms sufficiently described for us to identify them with this malady.

121. Are the Austrian surgeons of opinion that ten days' quarantine is sufficient?—(*Mr. Ernes.*) They were of that opinion at the Congress; we were out-voted. I and my colleagues were of opinion that ten days' quarantine was not enough.

122. Are the Austrian surgeons also of opinion that the steppe cattle are the only cattle which have the power of conveying this disease for a length of time?—Yes.

123. Is that an opinion in which other scientific men agree?—Different scientific men agree in it.

124. You say that it breaks out on the journey where 100,000 of them are together?—That is generally when it is perceived; but whether it prevails in the steppes there are no means of ascertaining.

125. You also say that it was suspected to have broken out in the Crimea, and in 1814 when large numbers of cattle were massed together?—A large number of cattle were massed together; but, if I am allowed to say so, that is not the cause of it, because I can point to two cases where large quantities of cattle were massed together, not only in the French army but also in the English army. I can refer to the six years' war in Spain; there a large number of cattle were with the English army as well as with the French, and they were all massed together, and the disease never broke out. I can refer also to the African war, in the case of the French under Charles the Tenth, and Louis Phillippe, and I believe under Napoleon the Third, there numbers of cattle were massed together, because they had to send them over from different parts wherever they could get them. I am informed that they stood up to their knees in the mud, and that they were in the most wretched condition, and still the pest never broke out. I should say that diarrhœa and dysentery broke out among them, but never this peculiar pest; and wherever the armies have been, if no Russian or Austrian troops have come to them, the disease has never been known to break out.

126. Is the steppe cattle a different species from the others?—Decidedly; he is a small ox with a large arched back, thin neck, and generally long horns, but sometimes small. He is of a slate or mouse colour, with very long, strong, black hair on the back and under the belly; when seen you cannot forget him.

127. (*Chairman.*) You have stated that you believe that this cattle plague always existed in certain steppes, but not in others. I believe you stated the Asiatic steppes?—That is the opinion of those who have more carefully investigated it. They say that the Asiatic steppes are the locality where it comes from, but it is soon spread over the European steppes, which are hardly ever free from it. It is, however, their opinion that if we could draw a line between the European and the Asiatic steppes we should not have it in Europe at all; they say that it is clearly an Asiatic disease.

128. What are your sources of information?—My sources of information are the German professors. Professor Gerlach, I believe, is still in this country. I believe that he is acquainted with the disease, and that if your Lordship thought it worth while to examine him, he would not have the slightest objection to be examined.

129. Is there any special Report by Commissioners appointed by the Austrian or Russian Government on the disease existing among these cattle?—I think that there are Government documents. I think that the Archives of Vienna would furnish the Commissioners with all the information, if there were time to obtain them.

130. (*Professor Spooner.*) Did I rightly understand you to say that in the event of a number of steppe oxen being taken from the steppes, although perfectly healthy at the time, they may carry with them the germs of the disease, and that the disease may break out in those animals at any period subsequently?—I cannot say how long a time, but I have been informed that it frequently breaks out after the cattle

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have left; but us to the number of days I cannot say whether 20, or at any time they carry the germ of the disease.

131. (*Dr. Playfair.*) Is that consistent with saying at the same time that 10 days' quarantine is quite safe for the steppe cattle?—It is not consistent; and therefore I want a longer quarantine.

132. (*Chairman.*) Would you say any time; would it be safe after 30 days or 40 days?—I do not know whether they would go quite so far as that, I believe that for the steppe ox there ought to be no quarantine at all.

133. (*Viscount Cranborne.*) You think that he should always be slaughtered?—Yes.

134. (*Dr. Playfair.*) Is it not the case that there are above 6,000,000 cattle in the steppes which are reared for the purposes of exportation?—That is so; and I believe that up to this day they kill them for the fat and the skin, and leave the carcase to rot on the steppes; I believe that you would be nearer the mark if you said 8,000,000 or 10,000,000.

135. (*Viscount Cranborne.*) If fairs always exist in Bessarabia, and if this Rinderpest always exists in the steppes, how is it that we have not had the Rinderpest every year?—Because we have not always been in direct communication; but these oxen are now brought to England from the south of Russia, or even from Hungary. Cattle can now be brought here in six or eight days from the south of Russia, consequently we have now what war has formerly done for the rest of Europe. Railways have done it in these days. Cattle have been brought in a few days from the south of Russia to Riga.

136. Are these districts often surrounded by a cordon?—Every time when they have this malady.

137. Is that often?—Very often, I am sorry to say; I think that they have it every three or four years. The Prussians are more free from it because they take greater precautions, but the Austrians are hardly ever free from it. I believe that for 25 years they have had it in Hungary.

138. (*Dr. Playfair.*) Is it not the case that there is an immense exportation every year to almost all parts of Europe, excepting this neighbourhood, from the steppes of Russia?—To Austria and Prussia.

139. And a good many other parts. I have seen a report from Russian Minister giving the names of all the places from which exportation takes place, and it is very extensive?—Exportation has very much increased since 1857.

140. This is from the official report. "In Russia "6,000,000 cattle are raised on the steppes, and are "exported every year throughout Russia, Germany, "Poland, Anatolia, and even into Syria?"—Yes, that is correct.

141. (*Professor Spooner.*) Do you know whether the animals so exported are usually soon slaughtered, or are they kept as stock animals?—I believe that they are very generally slaughtered.

142. (*Dr. Playfair.*) Do they not generally become thin and unfit for slaughter during their long marches?—No; they are fat before they come; that is the advantage of the steppe. The grass is almost as high as the ox himself. He is fattened on these immense prairies, and he is sold as fat; if he loses a little of his flesh on the road that is of no consequence.

143. (*Mr. Read.*) How many miles has he to go?—I cannot tell you; a great distance.

144. (*Professor Spooner.*) But they now avail themselves of the railway.—(*Professor Simonds.*) They must get to Lemberg first.

145. (*Chairman.*) Is the Report of the Congress of Surgeons at Vienna published?—(*Mr. Ernes.*) The minutes are not published. I expect them about the middle of this month. There is a report, but it is not quite finished.

146. (*Dr. Parkes.*) Is there an absolute unanimity of opinion among the German and the Russian veterinary surgeons, that the disease never can arise spontaneously out of the country?—They are unanimous upon the point. There is no difference of opinion as to its being confined to the steppe ox, and that it has never arisen spontaneously in any country out of the steppes. That is the opinion of the Prussian and Austrian veterinary surgeons. It was advanced by Professor Jessen, that if the cattle could be inoculated with this disease before coming out of the steppes we should be free from it altogether. It is a well known fact that an animal never contracts it twice.

147. I thought that Jesson himself had expressed his opinion that it might occur twice?—He has expressed his opinion that it could not. He has practised inoculation on the large stock of the Grand Duchess Helena; but it seems that unfortunately he lost about 90 per cent.

148. (*Mr. Ceely.*) Is Monsieur Gellé still living?—No.

149. He states his opinion that the disease does not always arise from foreign cattle, but that it occurs spontaneously?—I know that he is of that opinion, and several other French authorities are of same opinion; but I believe that it has been proved by Renault, who was well versed in it, that it is not so. Renault's report is in my possession, and if the Commission wish to see it I can forward it at any time in that report; he clearly proves that it is not so.

150. Gellé admits that it is a disputed point?—I believe that he establishes it. Delafont, who wrote very much on it, had never seen the disease himself.

151. (*Mr. Wormald.*) Are there any premonitory symptoms which occur in this disease which are pretty generally observed?—I have not noticed any. I believe that a cow or an ox might be perfectly healthy at night, feed well, and milk well, and that not the slightest disease might be perceivable, and that the next morning it might show decided symptoms of the disease.

152. In what way?—There is a sort of dulness; a hanging of the head, and a coldness of the body, and loss of appetite and of milk,—general debility, and partial tremours. After that, at another stage, there is a running of the eyes and the nose, emphysema, with crepitation. Diarrhœa might set in on the second or third day, and about the fifth day it is generally fatal; but it begins by nervous symptoms, and at times those symptoms are so strong that a cow might be found dead in the morning without having been suspected to be ill at all.

153. Then the first symptoms are not always alike?—They are not always alike. There have been cases where the animals are savage, butting at everything—a sort of delirium. Sometimes there is a shaking of the head to and fro; if you lift it up, it goes down again like a dead weight.

154. (*Chairman.*) (*To Professor Simonds.*) When was the outbreak of the disease in England first brought to your immediate notice?—On the 4th of July, Mr. Priestman, a veterinary surgeon living near to the Metropolitan Cattle Market, and Mr. Nichols, the son of Mrs. Nichols, who has a large dairy at Islington, came to the Veterinary College, bringing with them the stomach and intestines of a cow, they being under the impression that the animal had died from poison. They requested me to inspect the whole of the animals. I did so, and made very strict inquiries at the time as to the manner in which they had been fed and managed, and I satisfied myself before I left the premises that there was no poison in the case. A doubt, perhaps, might have existed in one's mind as to whether anything deleterious had been taken by the cattle through the water, the well having been recently opened, and being then only partially covered. I had some of the water taken, and portions of the viscera of another animal, which I had killed, removed to the college for analysis. I went on with my inquiries into the disease, and in the course of a day or two I satisfied myself that it would be quite a useless expense to have the water or contents of the stomach analysed.

155. Did you come to any conclusion as to the

cause of the death of these cows ?—I came at once to the conclusion that they were dying from a special disease having many of the characters of the one which we now know in this country as the Rinderpest. I made, however, no observation of that kind to Mr. Nichols or to his mother, or even to Mr. Priestman, the veterinary surgeon, until he, Mr. Priestman, got into the cab with me to return to the college, when I immediately said to him, and I think as nearly as possible in these words, "I believe that there is "no poison in this case, but that we have a new "cattle disease in the country."

156. When did you first satisfy your own mind that the disease which had broken out in England was identical with that which you had seen in Galicia?—Within a very days. There were some points of difference which required investigation, for example, there was not the same amount of discharge from the eyes of the animals, nor the same nervous twitchings about them that we had observed in Galicia. There were also other minor points which required to be investigated I however ascertained on the very next day that this was not an isolated case of the disease, and that the malady had appeared also at Hackney, and I was enabled subsequently to trace the introduction of the disease into two dairies at Hackney. It was on the morning of the 10th of July that I called the attention of the Privy Council to the matter; my attention having been first called to it on the afterpart of the 4th of July. I occupied five days in investigating the matter thoroughly to my own satisfaction, and on the 9th of July my mind was fully made up.

157. You had seen some other cases besides this of Mrs. Nichols ?—The cases became very frequent directly afterwards. By the 14th of July I had ascertained that the disease had shown itself at another dairy in Islington, and also in others in Goswell Street, Holborn, Somers Town, Camden Town, Hendon, Dalston, Kingsland, and near to the Cumberland Market. There was a dairy of cows nearly opposite the Veterinary College, which was swept away, with one or two exceptions, in the course of ten days. The malady appeared on July 8th, and by the 19th the owner had lost by death 17 cows, in addition to three which he had sent away, out of an original stock of 21.

158. By that time had you made up your mind that the Rinderpest which you had seen in Galicia had actually broken out in this country ?—Yes; having seen it first on the 4th of July, by the 9th, as previously stated, my mind was fully made up.

159. Did you make inquiry whether there had been any cases prior to this ?—I made every inquiry which I could, both before and after calling at the Privy Council Office, and I was informed on the 26th of July that some cases had occurred previously to those at Mrs. Nichols in the neighbourhood of Whitechapel. I went to the place on the same day, and found that similar cases had occurred there, but rather after than before the cases which were observed at Hackney and at Islington. There was only a day or two's difference, but they were distinctly cases occurring after, and not before.

160. Can you give the particulars of these cases? —Yes. The animals belonged to a Mr. Dewson, who is a cattle dealer as well as a dairyman. The disease was first seen on July 1st, at which time the stock consisted of 15 cows. It was the custom of Mr. Dewson to keep about this number for milking purposes, but being a dealer in cows they were added to almost each succeeding market day, both by cows belonging to himself and also by others belonging to a Mr. Pack, who often buys cattle with him. All unsold cows are send to his sheds to wait for the next market day, and thus a portion of the stock was continually changing, and as it happened animals which had been exposed to the disease went directly to his sheds from the Metropolitan Market. On the occurrence of the disease 13 out of the 15 animals were disposed of, some for slaughtering, but how many I was unable to learn. The 13, however, are said to have been got rid of in less than a week. The two remaining animals are likewise said to have entirely escaped the disease. One of these I saw on the premises at the time of my visit.

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161. Were you able to trace the origin of the disease in the cases at Hackney and at Islington ? —The origin of the disease in the case of Hackney was the purchase of a cow in the Metropolitan Cattle Market on the 19th of June, being one sent from Buckinghamshire with several others by a Mr. Birdsey, who is a large cow dealer. The animal was bought by a Mr. Baldwin on Monday the 19th of June. Almost simultaneously with the appearance of the disease among Mrs. Nichols's cows this cow was attacked with the disease. Mr. Priestman, the veterinary surgeon, saw her on the evening of Wednesday, June the 28th. She died within 24 hours of being noticed to be ill, but the true nature of the disease was not suspected. No other case occurred at Mr. Baldwin's until July the 5th, when Mr. Priestman was called to a second cow which had also been bought in the Metropolitan Market on June the 19th. This animal was slaughtered. On Friday July the 7th three cows and a bull were attacked, and they also were slaughtered. On Sunday the 9th, four more were attacked, and were taken to the slaughter-house. On Monday the 10th another was slaughtered; thus making 10 out of Mr. Baldwin's stock of 20 in the course of 12 days. The animal he bought on the 19th of June in the Metropolitan Market was an English cow. Mr. Birdsey is a highly respectable cattle dealer living in Buckinghamshire.

162. Where did Mr. Birdsey get the animal ?—That I cannot say; he bought it probably with other animals. His custom is to bring every market day a number of cows to London.

163. In the Islington case were you able to trace the origin of the disease ?—Not so distinctly; Mrs. Nichols had a large dairy; it consisted at the time of the outbreak of the disease of 93 cows, and it is the custom in all large dairies of that kind to send cows to market nearly every market day out of the stock, as fat cows, and also to purchase fresh cows for milking purposes; consequently a large dairy is more likely to suffer from a contagious disease than a smaller one, presuming that the disease is abiding or has any existence within the market from whence the animals are brought. There can be no doubt that the disease was communicated either in that way or by foreign stock which had been in the market going into the lairs, as they are called, which are immediately connected with Mrs. Nichols's cattle sheds, the lairs being in the same yard and nearly under the same roof. Mrs. Nichols's chief business consists of taking in these animals from market day to market day, and also those which have landed at Blackwall and other wharves. Therefore, presuming that this disease was of foreign or even of English origin, there would be a great probability of her animals being early infected.

164. You were not able to trace up any one animal which Mrs. Nichols purchased in the market ?—No. The first time that the attention of a veterinary surgeon was called to Mrs. Nichols's cases was on Tuesday, June the 27th, and to the Hackney cases on Wednesday the 28th. The note which I made on the 4th of July is this: "The first case "occurred on Tuesday, June the 27th; a cow was "seen ill, and Mr. Priestman's attention was called "to her, and to others which were attacked on the "following days. Eight or nine were then ill to a "greater or a less extent. Mrs. Nichols's stock con- "sisted at the time of 93 cows. It was thought at "first that the animals had partaken of some dele- "terious matter, but as the disease went on I was "consulted by Mr. Nichols, junior, and by Mr. Priest- "man, who called at the college on July the 4th, "bringing with them the stomachs and intestines "of a cow which had died the day before. The "mucous membrane was inflamed in patches, and the

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"feculent matter contained in the intestines was "fluid, stinking, and of a dirty white colour. I "attended immediately, and found that 22 cows had "been disposed of since the outbreak, and that 12 "others were now affected."

165. Twenty-two cows had been disposed of in consequence of their illness?—Yes, between the 27th of June and the 4th of July.

166. In what way were they disposed of?—By being sent to the market, or to the slaughter-house. Some were disposed of to the knacker.

167. How many of Mrs. Nichols's herd died of the disease?—I could not understand. She lost the whole of the 93, and she subsequently bought some others, lost them, so that I think her total loss amounted to 109 or 110 animals.

168. But of those a considerable portion were sent for sale to the market when they appeared to be sick?—They were sent either to the slaughter-house or to the market. I think that in her case the greater part of them were sent to the slaughter-house, and not to the market.

169. You cannot state the number that died, and the number that were slaughtered?—There has been a difficulty in getting at such particulars; we experienced in this case just what we have experienced in every cowshed on the outbreak of the disease in London. We cannot get at the number which died and the number which are slaughtered.

170. You cannot give the Commission any information upon that point?—I can give no satisfactory information upon that point.

171. Was there anything defective in the arrangements of these dairies with regard to drainage or ventilation, or the general housing of the cows?—In Mrs. Nichols' case, nothing whatever. I never saw any animals better managed than hers were, and so nicely was everything kept that they could tell to half a pint of milk each morning and evening what each cow gave, and also to a pound of food what the animals consumed in a day. I had the feed book brought to me, and ascertained exactly what the animals had had, and the milk they had yielded. I considered that inquiry important as determining whether they had been poisoned by anything in their food.

172. In what part of London was this?—In Islington.

173. Can you describe the sort of building which they were in?—They are sheds with good roofs, and four walls to them. Some of the sheds are long buildings with walls of sufficient width to allow the animals to stand with their heads towards the wall, leaving a passage in the centre. Some of the sheds contained 20 animals; others more and some less. There was a free current of air through the buildings, and free egress and ingress, and the superficial drainage was all carried out at the end of the building. The sheds were kept very clean indeed.

174. Was it the same with regard to the Hackney case?—In the Hackney case the dairy was not so well kept as in the other case, as I was informed by Mr. Priestman. I did not visit the Hackney dairy to ascertain how things were managed there.

175. After these cases had come to your notice, what course did you pursue?—I kept myself, so to express it, constantly upon the alert to get information. I adopted all the means which I possibly could to obtain particulars of other outbreaks of the disease. Wherever I heard of outbreaks of disease I inquired into them for the purpose of ascertaining whether it was the same affection or not. I satisfied myself, in several instances, that it was not the same affection. Besides this, I sent a circular letter to every veterinary surgeon in England, asking whether any such disease existed in their several localities or not.

176. Were all the cases confined to London which first broke out?—All the original cases were confined to London, but in a very short space of time we had the disease in Norfolk, and also in Suffolk, and likewise in Shropshire.

177. I think you have said that you went to the Privy Council Office, and reported the disease there; were any steps taken which you suggested?—The course which I took was this:—I must inform the Commission that just at that time I was engaged on the part of the Government to inquire into an outbreak of small-pox of sheep which happened in the county of Sussex, and that put me into daily communication with Mr. Simon. As soon as I had satisfied myself of the exact nature of this affection, I called on Mr. Simon, and I had conversation with him on the subject, and he asked me to walk over to the Privy Council Office, where I saw Mr. Helps. The matter was then again gone into, and I immediately went with Mr. Helps to Sir George Grey, and had communication with him.

178. And the result of that was the issue of the present Order of the Privy Council?—The result of it was, the issuing of an Order in Council, chiefly for the purpose of ascertaining the extent of the disease existing in the London dairies. The order was to the effect that each person should give notice of the existence of the disease.

179. Had any cases been traced to the market at that time?—The cases occurring in Norfolk and in Suffolk, as well as those occurring in Shropshire, were traceable to the market.

180. Can you state any particular case, either in Norfolk or Suffolk, which came to your knowledge, and which can be traced?—I am hardly prepared this morning to give precise dates; but the letter I have here describes the outbreak of the disease in Norfolk. It was one of the first letters which I received. It was directed to my colleague, Mr. Varnell, the writer, Mr. Gooch, thinking that I might be out of town. It is dated Reepham, July 22d, 1865. "Dear Sir,—It sometimes "happens that you are in Norfolk at this time of the "year, if so I have a lot of Dutch bullocks which I "should like you very much to see; they belong to "Mr. Leeds of Whitwell. He bought 26 on the "1st of July at 9*l.* each. They all came home "very fresh and looked well. In about four or five "days several were attacked with acute fever, putrid "fever, or pest. Eleven are dead, and several more will "not last more than a day or two; all have taken the "disease, and only about three appear to be getting "better. Four others which have been mixed with "them are coming down with it, one of which is not "likely to live. The first symptoms are a particular "redness of the nose and mouth, attended with great "heat, a yellowness of the skin, and the hair standing "up. In most cases a cough with great difficulty in "breathing exists, the animal making more noise in "expiration than in pleuro-pneumonia. The bowels "are slightly costive, but about the third day a "looseness takes place, the excrements being watery "and offensive. Afterwards a viscid slimy matter is "discharged. The membranes of mouth, nostrils, and "eyes are redder than natural, and discharge very "much; in some quite a purulent matter. The "mouth and throat in many cases are so affected "that the membrane sloughs off in places. They last "about four, five, and six days. I never saw anything "like it before. One night four died. Mr. Sayer of "Norwich has been over to see them. Mr. Emms of "Foulsham has eight out of the lot at another farm of "Mr. Leeds which he attends to. He has lost four out "of eight, and I have lost seven out of 18. I will thank "you to send me word if you have had any report of "anything of the same kind from any other part. "Your obedient servant, R. P. Gooch." A second letter from Mr. Gooch is to this effect:—"I have to "thank you for your kind note of the 29th instant, "and in reply I have to inform you that Mr. Leeds "has lost 13 out of the 26 Dutch beasts. When "they first came home he divided them into two "lots, placing 18 at Whitwell, and eight at Thim-"blethorpe about four miles distant. First, as re-"gards the Whitwell lot, they have all had the "disease, and eight are dead; the remaining 10 "appear to be recovering; some have been very

" bad. They were mixed with four others, which " have all taken it, and one has died; one is better, the " other two now suffering; and I do not think they " will live. At Whitwell there is a common adjoin- " ing Mr. Leeds with about 30 cattle on it; two are " attacked, and are not likely to recover, and others " are showing symptoms of the disease. Out of the " Thimblethorpe lot five are dead, and three are re- " covering. I have been called to two farms in that " locality where the disease has broken out; one animal " is dead, and several others are bad. I have also " heard of another farmer having it. I find at North " Walsham a dealer bought 38 'Irish buds,' at about " about 5*l.* each. 36 are dead; and from this lot the " disease has spread to several farms adjoining, and " the stock are dying fast. I have not at present " heard about any more cases in Norfolk; if I should " I will write, and say how the disease goes on."

181. How does he trace the origin of the disease as respects Mr. Leeds's cattle?—From the purchase of some Dutch bullocks in the Metropolitan Market.

182. (*Mr. Read.*) Did he buy them in the Metropolitan market?—Mr. Leeds himself, I believe, did not buy them in the Metropolitan Market. You, Mr. Read, are thoroughly acquainted with the details of this case, and will probably state where Mr. Leeds did obtain them from.

183. They were bought by a dealer of the name of Goss in the Metropolitan Market, and brought on to Norwich, and sold to Mr. Leeds?—Yes. Mr. Goss's report is, that on Thursday, June 29th, he bought 44 Dutch oxen of Mr. Poole, and sent them on to Norwich, and sold 26 of them on July 1st to Mr. Leeds of Whitwell; and that he heard last Saturday that 11 were dead and the the others were ill. This is Mr. Goss's own report to me, as entered in my note book,—so that the disease is clearly traceable to the Metropolitan Market.

184. (*Chairman.*) Is it known where Mr. Goss obtained the cattle?—Mr. Goss obtained them of Mr. Poole, who had them direct from Holland.

185. And have you been able to trace the disease existing amongst this lot of cattle before they were on the market?—I have not. Subsequent information brought out a remarkable fact, namely, that in July we were receiving diseased cattle from Holland. I was surprised to find that a great number of animals that were sold in the Metropolitan Market during the month of July and also in August, and which gave evidence of the disease, were Dutch cattle. I thought it not unlikely that when persons called them Dutch they might not really be Dutch, but foreign cattle. It is a very common thing to call almost all foreign cattle "Dutch cattle," but in tracing matters out, I found that they really were Dutch cattle, and that it appeared that Dutch cattle were more frequently affected by the disease after having been in the Metropolitan Market than other foreign or English cattle.

186. You have used the word "disease;" do you mean this particular disease?—Whenever I use the word disease, I mean rinderpest.

187. (*Dr. Playfair.*) Did you say that it was an imported disease from Holland?—I shall be able, I think, to explain it more fully.

188. (*Chairman.*) You were speaking of the Norfolk case; you alluded to the importation of disease through the Dutch cattle. Will you give the Commission some facts as to the introduction of the disease from Holland?—I think that the inquiry had reached as far as this, namely, that diseased animals had found their way from the Metropolitan Market into Norfolk, and that they had communicated the disease, that is the rinderpest, to animals which they came in contact with. I have stated that Dutch cattle were known to be affected with the malady in the month of July; and that several of the subsequent outbreaks of disease in different parts of England depended upon persons buying Dutch cattle. I said that at that time the facts were not very ready of explanation, but that subsequent investigation of the matter showed that they were very easy indeed of explanation. Thus in the month of June a Mr. Defries, who lives in the neighbourhood of Schiedam, sent over a number of oxen to his son, who is a cattle salesman in the Metropolitan Market, for sale; they were fat cattle, and Mr. Defries, junior, had an offer for them of only 13*l.* 10*s.* per head. These animals went into the market on the 22d, the 26th, and on the 29th of June, or, more correctly, 12 only of the lot went in three times, and the other 11 went in twice. As he was only offered the sum of 13*l.* 10*s.*, which he considered not their value, he communicated with his father, who determined to have the animals sent back again to Holland, and they were so sent back.

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189. How many were sent back?—Twenty-three.

190. The whole number were sent back?—Yes, the whole 23. During the intervals of these animals going into and out of the market, they were placed in Mrs. Nichols' lairs and fields, where the malady was then existing. You will not have failed to have observed that we have evidence of an outbreak of disease in Mrs. Nichols' case on the 27th of June.

191. On what day were they sent back to Holland?—They were sent back to Holland on the 2d of July. They went from Blackwall in a vessel called the "Batavia." They were seen by Mr. Simmonds, the inspector for the Customs, at the time of their being put on board the vessel, who is reported to have remarked that they had an unhealthy appearance, but he had no power to stop their exportation. The Commission is aware that his duties consist of inspecting animals that are imported. Within a few days of their arrival at Mr. Defries's, that is in the neighbourhood of Schiedam, the malady had so far extended among them that 21 had died. I cannot give you the dates of their death; but if it is the wish of the Commission to examine Mr. Defries, the cattle salesman, who is in London, he will probably be able to give you the precise dates. On their arrival in Holland they were placed in a marsh adjoining another, in which were a number of cattle belonging to Mynheer Frank Vandervelden at Kethal, to whose animals they communicated the pest.

192. Those cattle of Mr. Defries communicated the disease to the cattle belonging to Mr. Vandervelden?—Yes. Before, however, the nature of the disease was known Mr. Vandervelden had sold upwards of 20 of his oxen, by which it unfortunately happened that the disease was spread in the district.

193. To whom had he sold those animals?—That I do not know. The notes I have at hand show that the malady was afterwards re-imported into England week by week, all parties acting in perfect ignorance that the pest was incubated in the systems of the imported animals.

194. As far as your evidence has gone it implies that the disease of those cattle of Mr. Defries had been acquired in London, and not in Holland; have you been able to trace it at all in London?—They were in the Metropolitan Market on the three occasions referred to, namely, the 22d, 26th, and 29th of June, and we proved distinctly that as early as the 19th of June we had the disease in that market.

195. (*Dr. Playfair.*) Have you proved that yet?—Yes; the Hackney cows prove it.

196. Have you proved that there was disease in the Metropolitan Market?—We have proved that a cow that was bought there died ten days afterwards with the disease, and which disease she must either have received in the market or have engendered, presuming that the incubation of the pest is about nine or ten days.

197. (*Chairman.*) When did Mr. Defries's cattle arrive in London from Holland? When did they land in England?—I am not sufficiently precise as to the day they arrived in England, but they arrived in England so as to go into the Metropolitan Market on the 22d of June.

198. And the disease did not show itself among those cattle until after the 3d of July. Is that the case?—The disease did not show itself in those

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animals until their arrival in Holland, to an extent sufficiently to destroy life, but they were observed to be out of health when they left England on the 2d of July.

199. At that time were any inspectors appointed in the Metropolitan Market ?—There has always been an inspector who acts under the Corporation of the City of London, and I have no doubt that he was present throughout the whole month of June.

200. Would his attention have been specially directed towards cases of Rinderpest ?—Not at all ; nobody had the least idea that we had any such disease existing in the country in June ; at least it was not until the 27th of June that we had any evidence of the disease being here. One case occurred in Mrs. Nichols's establishment on this day, and a second in Mr. Baldwin's establishment at Hackney on the following day.

201. From the evidence you have given with reference to Mr. Defries's cattle, it would appear that they may either have caught the disease on Mrs. Nichols' premises or in the Metropolitan Cattle Market ?—Yes.

202. You have not been able to trace it further than that ?—I have not been able to trace the taking of the disease further than that. I am enabled, however, to state that at that time, namely, during the whole of June, to use a common expression among salesmen, there were dull times, or bad markets, and animals consequently went in and out of the market day by day ; for example, if they were not sold to-day, they went back into the lairs, and were brought again into the market the next day.

203. Are there any more cases in which you can trace the introduction of the disease into England from Holland ?—Yes ; there are several cases in which we can trace the introduction of the disease from Holland.

204. Prior to its introduction into Holland from England ?—No ; the only case in which we can trace the disease from England into Holland is the one to which I have referred, but subsequently to that we have traced several outbreaks in England which were dependent upon the introduction of animals from Holland.

205. Have those cases been traced up to the cattle of Mr. Defries, which cattle originally caught the disease in the cattle market in London ?—They have been treated as coming out of the same district in Holland where Mr. Defries's and Mr. Vandervelden's animals were.

206. (*Dr. Playfair.*) Was any disease known in Holland before that period in July when those animals of Mr. Defries were shipped from England to Holland ?—There not only was no disease known in Holland, but at my request a communication was sent from the Foreign Office to the authorities in Holland,—I cannot say exactly when, excepting that it was in the latter part of July ; and the answer that was returned by the Dutch Government was that they had no disease of the kind in Holland. The disease indeed had absolutely existed in the neighbourhood of Schiedam for some fortnight or three weeks without the Dutch Government knowing anything whatever about it.

207. At what time did it exist near to Schiedam ?—It broke out there immediately on the arrival of the animals that left London on July 2d, and it extended to the animals that belonged to Mr. Vandervelden: and by the sale of 20 of them before the true nature of the disease was known the malady was spread.

208. Is it your opinion that the appearance of the Rinderpest in the Metropolitan Market is not to be attributed to the importation of animals from Holland ?—Its original appearance there ? Most certainly not.

209. Why was it that the Dutch cattle when they came over to England were not sold, but were returned ?—I have already explained to the Commission that during the month of June there were what are called dull markets, and the animals consequently were not bid that price for that the seller thought they were worth. Mr. Defries, not receiving an offer greater than 13*l.* 10*s.* for the animals, considered that he would lose a large sum of money, and he therefore communicated with his father, who replied that rather than sell them at 13*l.* 10*s.* each in England he would have them sent home to Holland. They were very good and healthy animals, and they were merely sent back to Holland because a better offer was not made for them, or an offer equal to their value, there being, as I have said before, dull sales at that time of the year there.

210. (*Chairman.*) Can you give the Commission any information as to the Revel case, which has been so often quoted ?—Yes, I can ; but perhaps I may first observe as to that case that I had received information of a number of animals being likely to arrive from Russia ; that information was given to me one day while I was at the Veterinary College by a person who was himself somewhat connected with the importation of the animals. He mentioned it in a very incidental manner; but the conviction at once flashed across my mind that it was not unlikely if we went on importing animals from Russia direct that we should not be very long without introducing the Rinderpest. I felt therefore a deep interest in the matter, and I determined to keep my eye upon this lot of cattle, and to make all the inquiries that I could.

211. At what date did you receive that information ?—I made no note of the date, but judging from circumstances I think it was about the beginning of the month of May. The animals left Revel on the 22d of May.

212. (*Dr. Playfair.*) Were they not 6 days on their journey ?—Yes.

213. (*Chairman.*) You heard in the beginning of the month of May that some cattle were likely to come from Russia ?—Yes ; the number of the Russian cattle originally consisted of 321 oxen. They were imported by Mr. John Honck and Mr. Baker and Mr. Burchell. Mr. Burchell, who had been for some time in Russia, made a contract with certain persons for the purchase of a number of animals to be delivered at Revel ; after which he returned to England to supply himself with funds to pay for the cattle. An arrangement was made between him and Messrs. Honck and Baker, who are not of the same firm, but are consignees and large importers of cattle, for them to provide the money, and he, Mr. Burchell, to receive a certain per-centage of the profit. He represented that the animals could be purchased in Russia at a very small rate indeed, and that they could readily be transported by way of the Baltic when the ice broke up, and that the transaction would leave a very large profit ; in fact that it would be something like a profit of 100 per cent. Messrs. Honck and Baker put themselves in communication with a banker at Revel, and the money was placed there at Mr. Burchell's disposal. Mr. Burchell's contract was for animals weighing not less than 1,000 lbs. live-weight, and the number that he had agreed to buy were offered to him for embarkation, but as many did not weigh 1,000 lbs. he only took a certain number of them. Those animals were obtained from the Esthonian Agricultural Society. It has been supposed that the whole of the Revel cattle came from the Esthonian Agricultural Society, and that they were animals which had been fed in the sheds of persons for the purpose of sale, and consequently that they must have been all healthy and free from disease. Mr. Burchell, however, states that beyond the animals supplied to him by the Esthonian Agricultural Society, a number were sent down from the neighbourhood of St. Petersburg for him to choose from to meet the requirements of the contract, and that those animals were considerably injured on their journey. Finding that they were very much bruised, he refused to take them, thinking that they would not be saleable animals when they came to London. A dispute arose between the parties, and he had to

call in two experts, who were butchers, to determine whether any of the animals were, or were not, in a fit condition for him to take. They agreed that 13 of them were in a fit condition, and the 13 animals were consequently added to the number furnished by the Esthonian Agricultural Society, a point which I think is of great importance in tracing this disease. All the animals, consisting of 321, were shipped on the 22d of May, at Revel, and they came by the Baltic to Hull. The vessel called at Copenhagen for orders, and she made the passage in six days.

214. At what date did she call in at Copenhagen?—I do not know; but she arrived in Hull on the 28th of May, having made the passage in six days.

215. (*Dr. Quain.*) Are you including the 13 now?—Yes. I may remark in this place that 322 were selected, but one animal died in the yard before they were put on board, which reduced the number to 321. As to the cause of the death of that animal we have no evidence, but there is the fact that one of them did die.

216. (*Chairman.*) Did the animal that died belong to the 13 that were injured when they arrived at Revel?—Yes.

217. You have traced these animals to Hull. Will you be so good as to continue their history?—When Mr. Burchell started from Revel he was ordered to call at Copenhagen, because it would depend upon the state of the market and other things whether the animals should come on direct to London, or go to Hull, or anywhere else. He called, as I have said, at Copenhagen for orders, and he was directed to go to Hull.

218. What was the name of the vessel?—The "Tonning," steam vessel.

219. What nation did she belong to?—She was an English vessel. When she arrived at Hull, the animals, if examined at all, are said by Mr. Burchell to have been imperfectly examined.

220. Is it not usual for the Custom House officers to examine the cattle when they arrive?—Certainly so.

220*a*. Is any examination made by a veterinary surgeon?—A veterinary surgeon is, I believe, placed at each of the ports for the purpose of examining the cattle, but it is well known to the cattle trade that certain inspectors have been a little lax in the discharge of their duties. It has been said that some of the importers will even send a vessel round to a port where they know there will be but a very slight examination made, and that they will stop the vessel, and telegraph, "Make" so and so, or "Make" so and so.

221. If the law was properly carried out, cattle on arriving at a port would be inspected by a veterinary surgeon?—Yes, if the law is properly carried out they should be inspected closely by a veterinary surgeon at every one of the ports.

222. Will you be good enough to state what took place at Hull when the cattle arrived there?—According to the evidence of Mr. Burchell, whom I should wish to be called before the Commission, the animals were very imperfectly examined at Hull, and did not go into the Hull market, but 146 of them were sold in the field, to which they were sent direct from the vessel. I may mention that my information was obtained originally from Mr. Honck, and Mr. Honck may perhaps retort upon me by making an observation that he has made before, that I was satisfied of the healthiness of this cargo. My observation, however, to him was this: "It is necessary, "the disease having been introduced into England "from somewhere, that we should clear as many "cattle with regard to which suspicion may arise as "is possible."

223. You say that you obtained your information from Mr. Honck?—Yes, originally.

224. How many of these animals arrived at Hull?—The whole 321. One animal was ill on board the ship, and only one, according to the evidence of Mr. Burchell, who left Revel with them, and travelled all the way to Hull.

225. Was this case reported by the veterinary surgeon?—I believe it was not reported by him.

226. (*Dr. Quain.*) Did the animal that was ill on board recover?—Yes; they gave it brandy and water, and stimulants of that description, while on board the ship. The 146 which were sold in Hull went to Manchester.

227. (*Chairman.*) Were they sold in the public market?—No; they were sold near to the landing-place; they did not go to the public market. They were purchased by a salesman of the name of Septimus Lambert at Manchester.

228. Is it usual for cattle to be sold near to a landing-place instead of in the market?—I think it is not at all unfrequent. After these cattle came into the possession of Mr. Lambert, they were taken to Manchester, and it is stated that some of them were subsequently sold to go to Wakefield and others to Derby; but I should state that they were all sold for immediate slaughtering.

229. Can you give the dates of these transactions?—I cannot; but Mr. Lambert, if called, will be able to give that information.

230. Have you been able to trace the history of any of those 146 cattle subsequently?—The only information I have obtained about them is this, that after they were purchased by Mr. Lambert, he sold them for slaughtering, and that some of them were slaughtered in Manchester, others of them in Wakefield, and others in Derby. I have been able to trace no disease at all in connection with those animals.

231. Have you been able to trace the history of the remainder?—The remainder came on to London.

232. How did they come?—They came by railway, 175 of them, and, with the exception of 20, they were sold in the Metropolitan Market on Thursday the 1st of June.

233. Do you know who bought them?—Mr. Honck has informed me that 25 were sold to Mr. Lialter of Whitechapel, 24 to Mr. Webb of Newgate Market, 20 to Mr. John Cook of Whitechapel, 10 to Mr. Howard of Whitechapel, 8 to Mr. Hopwood of Whitechapel, 3 to Mr. Burrows of Whitechapel, 14 to Mr. Joseph Nathan of Whitechapel, 24 to Mr. Favell of Newgate Market, 7 to Mr. Green of Portsmouth, for the troops, 10 to Mr. Nind of Newgate Market, 1 to Mr. Bee of Newgate Market, 27 to Mr. B. B. Baker of Newgate Market, and 2 to Mr. Hartwell of Whitechapel.

234. Does that account for the whole number?—Yes, for the whole 175.

235. And they were all sold on Thursday the 1st of June?—No. I should explain, that 20 of them were first picked out by Mr. Baker on their arrival in London on the 31st of May, and were sent down to Gosport for the supply of the shipping at that place. The statement of their sale would make it appear that all of them were sold in the Metropolitan Market on the 1st of June. Twenty-seven are put down to Mr. Baker.

236. Have you been able to trace any of those lots any further than you have stated?—No; they were all sold in the Metropolitan Market for immediate slaughtering, with the exception of the 20 selected by Mr. Baker.

237. You cannot trace any connexion between any of those animals to any animal which was affected by the Rinderpest?—I can trace no connexion between these animals and any other animal which was subsequently affected with the Rinderpest; the only connecting point is, that on their arrival in town they were lodged in Mr. Honck's lairs in Maiden Lane, near to the Metropolitan Cattle Market, and went into the market for sale.

238. When did they arrive in London?—They arrived in London either on the 29th or the 30th of May. I presume it was the 30th of May.

239. And where were they placed?—In the lairs belonging to Mr. Honck in Maiden Lane, near to the Cattle Market.

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240. Will you describe the lairs you are speaking of?—They are yards or places where animals are kept from one market day to another. They are put there on arriving from the country or coming from abroad.

241. Are they in the open fields?—No; they are yards mostly having sheds in them, under which the animals can congregate.

242. It is not your opinion that the Rinderpest was introduced into England by this cargo of cattle?—I think it is highly probable that it was so introduced, but we have no direct evidence that it was. We can only show that the animals came from Russia, and that they were the first lot that ever did come from Russia by way of the Baltic. Any Russian animals that may have come here before have been first sent into Germany and fattened. We know, further, that these animals came from a district, or rather from a country, that is known to be the seat of the plague, and that within 19 days of their arrival we had the disease thoroughly established in the Metropolitan Market.

243. Were any of these animals steppe cattle?—That I am not able to say, but they were Russian cattle; whether they were purely Russian steppe cattle, or not, I do not know.

244. Have you endeavoured to trace any of those Russian cattle to their ultimate destination?—They were all immediately slaughtered, and therefore all the evidence is destroyed.

245. Were all the purchasers of those animals butchers?—Yes; with the exception, I believe, of Mr. Baker. They were all sold for slaughtering.

246. Have you ascertained that all those animals were slaughtered at the time you have mentioned?—Yes, as I am informed. I made particular inquiries into that.

247. You do not believe that any one of those animals remained alive, say after ten days from the time when they were sold?—I have not been able to trace any one animal that remained alive. I have got the names of all the persons, as furnished by the importer himself, to whom they were sold, and those persons alone are able to say whether they killed all of them or not.

248. Have you made any inquiries as to the ship in which these animals were conveyed, and whether it was used in the cattle trade subsequently to the disembarkation of these cattle at Hull?—I have no doubt that the "Tonning" has been engaged in importing animals since then. I believe that she scarcely ever lies idle; it is an important point; but I should imagine that the ship belongs to such parties that they would see she was well cleaned after each voyage, and before she went out again.

249. (*Viscount Cranborne.*) Have Mr. Honck's lairs been the seat of the disease?—Not that I am aware of.

250. Did you make no inquiries as to whether those were steppe cattle or not?—I cannot say that I did; but I do not hold the opinion which has been expressed by Mr. Ernes as to steppe cattle being alone the subjects of this disease, carrying about the germ of it with them. I hold that Russia is the seat of the Rinderpest, both in the steppes and out of them, and that the disease exists not only in Asiatic Russia, but very frequently in European Russia.

251. When you say "out of the steppes" do you refer to all parts of Russia?—I refer to all parts of southern Russia.

252. Do you base that opinion upon evidence which you have obtained?—I base it upon inquiries which I have made, and upon evidence.

253. Do you mean inquiries that you have made on the spot, or evidence that you have obtained from books?—I mean inquiries that I made when I was in Galicia, in northern Europe, and in Prussia, and from what information I have been able to obtain since.

254. You are probably aware that in expressing that opinion you differ from all the German and Russian authorities upon the subject?—I do not think it will be found that I differ from them all, but that I differ from only a very few of them. There are scientific men who hold the opinion that this disease has a spontaneous origin in the steppes of Russia and nowhere else; but I want to know where the line of demarcation is to be placed—where the disease springs up spontaneously, and where it results from contagion alone. We may narrow the space so as to come down to the length of this room, and say therefore that it is spontaneous on that side of the room (*pointing to the same*), and only spread by contagion on this.

255. You believe that the whole of southern Russia is the seat of the spontaneous generation of this disease?—I do not believe that it has a spontaneous origin anywhere. I believe that the whole of the southern part of Russia is the home of the pest, and that it always abides there.

256. Do you mean to say that it originally made its appearance there?—I cannot say that, or whether it came from Asia, or whether it is a continuance of the plague that fell upon the Egyptians; I think that we know no more of the origin of this disease than we do of the origin of small-pox or the cholera.

257. Do you believe that there is no instance of the spontaneous generation of the disease?—I believe so.

258. Do you apply that opinion to northern Russia as well?—I do not know that the disease does exist there, but, presuming that it does, I should apply the same opinion to northern Russia.

259. Why do you believe that the disease existed at St. Petersburg when the cargo of cattle to which you have referred was imported?—I only know this, that the whole of southern Russia is affected from time to time with the disease, and that if I were to start upon a mission to-morrow I should soon be able come up with the disease.

260. Is there free intercourse between the cattle of southern Russia and the cattle of northern Russia?—I believe that there is free intercourse between southern and northern Russia.

(*Mr. Ernes.*) I believe there is free intercourse.

261. (*To Professor Simonds.*) Have you any knowledge of the disease having existed in any part of northern Russia with reference to the importation of the cattle you have spoken of?—I have no knowledge of the kind; I merely know the general fact, that the disease always exists in Russia.

262. You mean southern Russia?—Yes; particularly southern Russia.

263. Entirely southern Russia?—No; I do not say that, but I would ask whether you would place St. Petersburg in northern Russia or in southern Russia?

264. Have you any knowledge of the disease in the neighbourhood of St. Petersburg as a persistent disease?—I have no knowledge of its being a persistent disease in the neighbourhood of St. Petersburg.

265. I am at a loss to understand your reason for believing that the disease was imported from St. Petersburg on this occasion?—It has been shown, so far as the information has gone, which has been obtained from the Russian authorities, that there was no Cattle Plague existing in May in Esthonia. How much that information is worth I cannot say; but I know this fact, that the disease, which I have already stated exists generally in Russia, spreads from time to time in Russia, and that we can always meet with it in different parts of the country. I think it, therefore, not improbable that at the time when these animals were selected from the neighbourhood of St. Petersburg, the disease, if not existing in Esthonia, might have existed in the district from which these animals came.

266. Can you give the Commission an idea of the particular parts of Russia in which this disease generally prevails?—This disease mostly prevails in what we call southern Russia; it prevails not only

there, but also in Moldavia, Wallachia, and in Podolia, and adjacent countries.

267. Does southern Russia include Moscow?—I think Moscow is in northern Russia.

268. (*Dr. Parkes.*) I understand that these animals left the market on the 1st of June?—Yes.

269. And that the first case occurred on the 27th of June?—No; the first case which was recognized in England was certainly on the 27th of June, but a case which occurred on the 28th of June was in an animal that was bought in the Metropolitan Market on the 19th of June; that animal was the first to be affected by the disease, and she communicated the disease to other animals on the premises to which she was sent.

270. Mrs. Nichols's case was on the 27th of June?—The attention of Mr. Priestman, the veterinary surgeon, who attends both for Mr. Baldwin and for Mrs. Nichols, was called to Mrs. Nichols' cows on the 27th of June, and to Mr. Baldwin's on the 28th of June.

271. It would appear that there were 19 days between the time when the cattle left the market and the first visible incubation of the disease?—Mr. Baldwin's cow was bought in the market on the 19th of June, and it was on the evening of the 28th when Mr. Priestman saw her, and 19 and 9 make 28. She was seen to be ill on the ninth day after exposure in the market, where at the time it is more than probable that several infected animals were located. The ordinary period of incubation is nine days.

272. From the time when the Revel animals left the market it was 19 days?—Yes; and it is just the connecting link that we want between the 1st and the 19th. That is where we fail.

273. How long was the cow in the market before she was bought?—Probably not less than five or six hours on the 19th. We have it also proved by the cattle which were sent back to Holland, that on the 22d of June the disease was established in the Metropolitan Market, as those cattle took the disease away with them.

274. I suppose that the butchers who bought the Revel cattle would take care that they were at that time not in a diseased state?—I do not suppose that butchers would buy any animals that were apparently diseased, but there might have been convalescent animals among them, or the one animal that was ill on board the ship might have been the subject of a mild attack of the disease, so that a butcher would not think it was sufficiently diseased to prevent its being sold, especially as it went into the neighbourhood of Whitechapel.

275. Could you ascertain from the butchers, whether, when they killed the animals, they noticed any disease?—It was quite impossible to do this.

276. (*Mr. Read.*) You say that you have two links; one on the 1st of June, and the other on the 19th. What is the link on the 1st of June, except that certain cattle from Russia were sold in the Metropolitan Market?—There is no other link. We presume that the Revel cattle were the subjects of this disease, and that they brought it into this country, but then we want the connecting link between the sale of those cattle on the 1st of June and the existence of the disease in the Metropolitan Cattle Market on the 19th of June. This, however, I think I may say, that prior to the importation of the Revel cattle there was no disease of this kind in the country—that is, there was no recognised disease of this kind in the country.

277. Then, of course, the first link is merely presumptive. Presuming that those cattle did bring the disease into the country, there is no connecting link between the 1st of June and the 19th of June?—No; I have none.

278. I apprehend that from the 22d of May, when these cattle were shipped at Revel, until the 2d or 3d of June, not a single case of disease of any sort appeared in any of those 320 cattle?—Not that I know of. One animal is admitted to have been ill on the passage. With regard to the disease existing in Russia, and particularly in Esthonia, I may, perhaps, be allowed to say that I put a series of questions to Mr. Burchell, and I have his answers in writing.

279. (*Professor Spooner.*) You allude to the person who had charge of the cattle?—Yes; the person who came with them all the way, and had of course the entire charge of them.

280. (*Mr. Lowe.*) As I understand you, you cannot show that the places from which these cattle were imported were the seat of the disease?—Only by what Mr. Burchell has stated.

281. I understood you to say that there was no disease there at the time?—The Russian Government, I believe, reported to the Foreign Office that there was no disease in Esthonia.

282. You cannot show that these cattle had any disease upon them?—I cannot show that they had Rinderpest, but I can show that one animal died in the yard before the animals were shipped, and that one was ill on board the vessel.

283. That was probably not more than the average?—One animal can scarcely be called an average out of a cargo of 321.

284. You are not able to show that those animals communicated the Rinderpest to any animals in this country?—No, I cannot.

285. (*Professor Spooner.*) You have stated that all previous importations of Russian cattle have passed through either Prussia or Austria in order to reach this country?—Yes, if any have come; but it is a disputed point whether we have ever had any Russian cattle excepting those that have been referred to.

286. You would presume, I suppose, that in the event of Russian cattle having been previously imported into this country, they had undergone before they were exported from the Continent a close inspection with reference to this disease?—Not only that, but they would be taken into Mecklenburg or Holstein or Denmark for fattening before they came here, and would necessarily remain there sometimes for months.

287. With the exception of those animals that were imported into this country from Holland, and which I think you rather lead us to understand had been previously sent from this country, what has been your experience with regard to foreign cattle brought into this country, say within the last six months?—That they have been very healthy indeed, and I thus show by negative proof why there is greater suspicion attaching to the Revel cattle. It is well known to every person that immediately the authorities in any of the countries in Western Europe knew of the existence of this disease it would be almost impossible for animals to be got from out of the infected districts; and there have been no regulations put into operation to prevent the free transit of cattle from out of Austria or Galicia or Prussia, and down to this time the trade is unrestricted.

288. (*Dr. Playfair.*) I think you stated that the steppe cattle were easily recognised?—Mr. Ernes stated that.

289. That they were of a peculiar character and very easily recognised?—Yes; they are so.

290. If there had been any steppe cattle the inspector at Hull certainly would have recognised them, would he not?—I should think not, for, in all probability, the inspector at Hull, as well as others of the inspectors at our ports, would scarcely know a Russian ox when he saw it for the first time.

291. Would not these cattle have been recognised in the Cattle Market here?—Unquestionably they would have been recognised as foreign cattle.

292. And as peculiar animals?—Yes.

293. Is there any reason to believe that there were any of the steppe race of cattle amongst them?—I cannot answer that question.

294. How long would it take for cattle to come from St. Petersburg to Revel, and what is the period

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of incubation in the disease ?—The period of incubation will be found to vary, but I think it is seldom less than seven days, and it may be extended to 14 or 15, or perhaps to a longer period than that.

295. From the time that the Petersburgh cattle were mixed with the Esthonian cattle, to the 1st of June, when they were exposed in the Metropolitan Cattle Market, was there not ample time for the incubation ?—The other Russian cattle were mixed with the Esthonian cattle about the 21st of May, the day before they quitted Revel, and the period of incubation, 10 days, would be just about expiring.

296. Is it not the fact that the importer stated that the cattle were not in a fit state for immediate slaughter ?—I think not; they complained of the animals being not fat enough for the English market, and consequently that they had to be sold at a diminished price, and that left so small a profit that it became a source of dispute between Mr. Burchell and themselves. Mr. Burchell had represented that these animals were all fine animals and fit for the English market, but they were found on their arrival not to be so, and they were not considered fit to be kept here to be made fatter.

297. As to the 175 head of cattle sold in London, and the 146 head which were sent to Manchester, Wakefield, and Derby, and the 20 which were sent down to Gosport, is there any account of the disease having been sown in any of those places before the 19th of June ?—Not that I am aware of.

298. (*Mr. Read.*) Have you any idea of the price that these cattle realized in London and elsewhere ?—No, but they were represented to have been bought at the rate of 2½*d.* per lb. by Mr. Burchell.

299. (*Chairman.*) Have you any other cases besides this Revel case in which you think you can trace the introduction of the disease into England from foreign parts ?—None whatever. I have failed to trace any other animals. We are getting animals from Hungary and from Galicia, and I know that those are parts of the Continent where the disease may be looked for from time to time. There is indeed a great probability that we may introduce the disease either from Hungary or Galicia or from Austria Proper; but such are the regulations there, that I scarcely think the disease could exist, and we get it from there. At any rate there have been no restrictions put in the way of the cattle trade.

300. I think you say that as a general rule foreign cattle are healthy ?—Foreign cattle, I believe, never came more healthy—I mean Hungarian, Austrian, and Galician cattle—than they did during the time that we have been speaking of, and even down to this time.

301. I believe you consider that the disease may be imported by hides; is there any chance of its being imported by foreign hides ?—I think there is no chance whatever of its being imported by foreign hides, unless the disease existed in Holland or in some other countries from which we might import hides. I have made strict inquiries with respect to the trade in hides, and have found that the Russian hides are salted, and then sent into Lubeck; that in Lubeck they are dried, and a great part of them sent up the Rhine as far as Switzerland. There was no export of fresh hides from Lubeck. I think, that looking at the system which is necessarily observed in the preservation of hides, we have a great security against the disease coming into this country by Russian hides. Unless we had fresh hides introduced from Holstein, or Denmark, or Holland, or Belgium, as I have previously remarked, and the disease existed in those countries at the time, there is, I think, no risk whatever of our getting the infection.

302. In what way did they disinfect the hides in Galicia ?—They were placed in a tub, and lime and water was put upon them. Lime was chiefly used for the purpose.

303. (*Mr. Read.*) Not a very good disinfectant ?—No; but they were taken out after being kept for a certain length of time in the mixture, and dried and kept upon the farm until the authorities thought fit to let them go for sale.

304. (*Dr. Parkes.*) During the period of incubation of the disease, say during the first eight days after exposure, can the infected cattle transmit the disease to other cattle ?—That is a problem which has not been satisfactorily solved, I think; but I believe, from all the observations that I have made as to diseases of a contagious nature, that as the period of incubation draws on, and as the time arrives for the declaration of the symptoms, animals can propagate the disease.

305. With regard to the Rinderpest, have you any observations to make ?—I think that late in the period of incubation the disease may be communicated.

306. (*Chairman.*) I suppose from your position very many cases which have occurred in London have been brought to your notice; have you been able to trace the disease to its source in many of those cases ?—We have been able to trace the source of the disease in several cases, but not, perhaps, in very many, and this in consequence of the system which prevails of persons sending animals to the Metropolitan Cattle Market and having them back again. One will be able to gather how the disease may have spread from a knowledge of the fact that there has scarcely been a market day up to within the last fortnight when there have not been animals sent out of the London dairies which have been the subjects of the disease, or been herded with the infected.

307. (*Dr. Playfair.*) And they have not been stopped by the inspectors ?—Some of them have been; but it is almost impossible to stop them all, for they are in and out of the market, and all sorts of tricks are had recourse to to get rid of them. We often fail to get information as to the whereabouts of the disease; perhaps it shows itself in a shed, and the man has ten cows; he will keep back one or two diseased ones, and send all the rest to the Metropolitan Market, and then give us notice.

308. (*Chairman.*) Some cases have probably come to your knowledge in which the disease has broken out spontaneously ?—There have been many cases which have come to my knowledge in which I have not been able to trace the introduction of the germ that would give rise to the disease, but nevertheless I cannot come to the conclusion that these have had a spontaneous origin.

309. Are there a good many cases of that sort ?—There are some, but not a good many.

310. Are there any cases which you can instance, and into which it would be useful for the Commissioners to inquire ?—There are none which immediately occur to me that I could name.

311. (*Dr. Playfair.*) Has the case of the Thorp Meadows, a few miles from Leeds, come to your knowledge ?—I have no information of that case.

312. (*Chairman.*) In these cases have there not been causes at work which might increase the virulence of the disease, such as unhealthy housing of the animals ?—My experience with regard to that is this, that it matters not how animals are housed, or how they are managed, nor what their age, sex, or condition may be; nothing stops this disease; if the germ is introduced the malady spreads.

313. It has been much more prevalent in London than in the country, has it not ?—Yes, it has; but only by attacking a larger number of animals in the same area of space. It has not produced more deaths in London than it has in the country.

314. That is to say, the per-centage has not been greater ?—No.

315. Putting London aside, and dealing with the country cases, have you been able to trace most of the country cases to their origin ?—Most of the original outbreaks in every county can be traced to the Metropolitan Cattle Market.

316. You have been able to trace the origin of the cases in the country unmistakeably to the Metropolitan Market ?—Yes; nearly all the original outbreaks

in the different counties of England are traceable to animals which were bought in the Metropolitan Cattle Market. For instance, outbreaks occurred on three distinct farms in Sussex, which I went to investigate, and it was traceable in every instance to calves bought in Chichester market, which had been previously bought in the Metropolitan Market and taken down to Chichester.

317. Have you been able to trace that those calves had been standing near to cattle which had been condemned by the inspector, or which had the disease?—No; I have been able only to trace that they had been in the Metropolitan Market, where the disease existed, every market day, from animals being sent out of London cowsheds, which were the subjects of the disease. Not only have animals been sent from cowsheds, but from various parts of the country. I can give you an instance which occurred in relation to the county of Kent. A gentleman bought, or rather he commissioned a person to buy for him, a bull, which animal was bought in the Metropolitan Market. This bull introduced the disease among his cows; it then spread to his bullocks, and fearing that he should lose the whole of them he selected a certain number of the bullocks, and sent them back to the Metropolitan Market.

318. Can you give the date of the purchase of the bull, and the date of the death of any cow?—Yes; I had a subsequent interview with the gentleman, but I fear that I have not got here the memorandum which I made of the conversation that then took place. I have no doubt that Mr. Spooner will recollect that the gentleman came up from the country and gave us the full particulars of this case himself.

319. Is there any other country case which has come within your knowledge, and to which you wish to refer?—The outbreak which took place at Portsmouth was due to animals having been sent from the Metropolitan Market, and also the one at Plymouth, as well as that which occurred in the neighbourhood of Market Drayton, in Shropshire. I will look out all the memoranda which relate to these cases and lay them before the Commission.

320. You have referred to the Metropolitan Market, and it would appear that that market has been the real seat of the disease. I presume that there were regulations with regard to inspections in that market, and will you be so good as to state what they were?—There were no special regulations adopted as to the Metropolitan Market until it was well known that the disease had gained great footing in the country, and also in London; and then the Corporation of London gave to Mr. Tegg, the inspector of the market, a number of assistants.

321. It is important to know the date of the first steps that were taken with regard to inspection in the Metropolitan Market?—I think that those steps were not taken more than about a month ago.

322. There were certain measures taken, but were those in your opinion sufficient to detect the presence of Rinderpest on a market day?—Certainly not.

323. Will you state what the measures adopted were?—Merely the attendance of an inspector, that is, one single individual who attends during the whole market day, and walks about among the animals, to detect anything that may give signs of disease.

324. He does not individually inspect every animal in the market?—No. He walks among them, and if he sees an animal that gives evidence of the mouth and foot disease, as an example, he will let it remain. If, however, he saw one that gave evidence of Rinderpest, he would inspect that animal, and have it at once removed. The inspection certainly has been far more critical, more severe, and better carried out during the last six weeks; but until that time the inspector had not sufficient assistants to do the work properly.

325. With a view to the future prevention of this disease, you do not consider the present system of inspection in the market sufficient to detect the signs of the disease?—My opinion as to inspection at fairs and markets is, that it fails in practice to prevent the spread of this disease. No staff of inspectors could inspect the Metropolitan Market, so as to effectually guard the public against buying animals which are the subjects of the disease in its early stages; and nothing could be known of animals which have been herded with the diseased.

326. You have described the ordinary measures that were taken for prevention; what were the extraordinary measures that were adopted on your suggestion?—Not on my suggestion. The only measure, as I understood it, was that of allowing Mr. Tegg some four or five assistants, to go among the animals and report to him whether they saw anything that was suspicious among them.

327. Have the Mayor and Corporation of the City of London jurisdiction over this market?—Entirely so; there is a Markets Committee to which all questions of detail are referred, and of which Mr. Gibbins is chairman.

328. Can you mention the date when these additional inspectors were appointed?—I cannot.

329. Did not the Privy Council lay down some special rules for the inspection of cattle in the Metropolitan Market?—None whatever.

330. Was that left to the Markets Committee?—It was left to the City entirely.

331. How do you believe that the measures taken by the City authorities have worked in the Metropolitan Market?—I have no doubt, that combined with the measures which have been adopted by the Government, they have worked very well; but unless the Privy Council had issued its orders I do not think we should have had much security from the manner in which the animals were inspected in the Metropolitan Market.

332. Can you state the number of the inspectors who are now employed in that market?—I think that besides Mr. Tegg there are four or five assistant inspectors.

333. Have any other means of prevention been resorted to in the market, such as by the use of disinfectants?—Yes. The market has been thoroughly disinfected after each market day; but until the appearance of this disease there was some inattention to the proper cleaning of the market. The Corporation have now insisted upon the market being thoroughly cleansed, and for disinfectants to be used all about the posts and rails in the market.

334. Before the disease broke out you do not consider that the Metropolitan Market was in a very healthy state for the cattle going thither?—I do not think it was in an unhealthy state, but that it was not kept so clean as it might have been; and presuming that we had a contagious disease existing in this country, such disease might have been spread through the medium of the excreta, and so on, in the market. I think there was great liability for the spread of the disease on account of the manner in which the market was kept.

335. (*Mr. Wormald.*) What becomes of the filth in the market; how is that disposed of?—I believe there is a contract made with certain persons to clean the market, but I do not know positively about the disposal of the manure.

336. (*Chairman.*) Do you think that since the Rinderpest broke out the market has been better managed, and that it is in a healthier state?—Decidedly I should say that it has been better managed. I do not say that it is in a healthier state, for there have been a good number of diseased animals sent to the Metropolitan Market on nearly every market day.

337. From the country as well as from the town?—From the town chiefly. There have also been many animals from the country in whose systems the disease was unquestionably incubated.

338. With regard to the transport of cattle before the disease broke out, do you consider that proper precautions were taken, and that the transport of cattle in this country was in a satisfactory state?—

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No; but at the same time I do not think that there was a sufficient amount of mismanagement to be productive of the spread of disease to any extent.

339. Were the trucks, for example, kept in a clean state?—No; far from it, and there was great necessity for them to be kept in a more cleanly condition than they were. But when I look back to the time when we had contagious diseases existing in this country, I can see that there was quite as much disease in Smithfield Market as has existed since the railway system was introduced. I am of course not an advocate for uncleanly trucks, but I do not think that railway trucks have tended much to spread disease in this country.

340. Besides the trucks, there are pens into which the cattle are driven at the railway stations; would the same remark apply to them?—Yes. When, however, we have in the country a disease as contagious as this disease is known to be, and when we are aware that every discharge which comes from an infected animal, from its eyes, its nostrils, or its mouth, that all the excreta and all the feculent matter are charged with morbific matter, we can see at once that there is great necessity for every place being thoroughly disinfected and cleansed down after being occupied by cattle.

341. Do you believe that the measures taken by the railway companies have been effectual since the Government have issued certain regulations?—I think that they have materially tended, with other means, to stop the spread of the disease, and had those measures not been taken the disease would have been diffused to a far greater extent.

342. In what state were the lairs before the disease broke out?—As a rule they were very seldom cleaned out; perhaps once in a fortnight or three weeks. Many were kept in a filthy state from animals continually out and in every day, and there was scarcely an opportunity to thoroughly clean them.

343. Would not that be sufficient to generate disease among them?—It might be sufficient to render animals more susceptible of ordinary affections, but not sufficient to engender a special disease such as Rinderpest or small pox, or any other affection of that kind.

344. Are there any regulations as to the number of cattle which are put into a given area. I mean with regard to overcrowding in the lairs?—I cannot positively answer the question, but I think not. I think they only contain as many animals as they conveniently can for the day.

345. Do you think that they are overcrowded?—There may be temporary overcrowding in any of them, as sometimes a lair which perhaps would accommodate 50 cattle may have this number in it to-day for an hour or two; that may be in the morning or in the evening, while in the other part of the day there may not be more than five or six animals in the same place.

346. With regard to the housing of the cattle, and particularly the cows in London, has that subject ever come under your observation?—I have visited a great many of the cowsheds in London, and I have found, so far as the Rinderpest is concerned, that in very many of them to which objection might be taken as to the number of animals kept in them, the height of the building and the cleanliness observed, the disease has not appeared, while in those which would be called healthy sheds it has appeared, simply arising from the circumstance that it has been introduced into the one and not into the other; for example, in Warwick Lane in the city—the city was the last part of the metropolis to become affected—the cows are kept in a cellar, and the disease has only recently made its appearance there.

347. Has the disease been there?—Yes, since within the last month, but there was none up to that time.

348. Was that cellar a healthy place for cows?—Not in my opinion; but the causes that the animals were exposed to were insufficient to engender a disease of this kind.

349. Without reference to this particular disease, will you be good enough to give your opinion as to the general state of the cowsheds in London?—The cowsheds in London are under the regulations of the vestries, and there are sanitary inspectors appointed by each vestry, who ought not, if they do their duty, to allow the sheds to be badly kept. I believe also that the Inspectors should measure the dimensions of the sheds, and report as to the number of animals that ought to be kept in them.

350. Do they inspect them carefully, and report any that are not kept in a proper state?—They report some, but whether they inspect them all as they ought to do, I think is a matter of doubt.

351. (*Viscount Cranborne.*) Is there any recommendation that you wish to make to the Commission with a view to the action of the Government, and which you think ought to be made at the present time, in addition to what has been already done?—I think that the time is drawing very near, if it has not already arrived, when the markets and the fairs should be suppressed in all the counties in which the disease exists.

352. (*Chairman.*) Has not an Order in Council been made as to that?—A discretionary power has been vested in the magistrates by which they can order a market to be suspended.

353. Does that include the Metropolitan Market?—I think it does not.

354. (*Viscount Cranborne.*) Would your recommendation include the Metropolitan Market?—No; I think that the Metropolitan cannot be dispensed with; but I would have it entirely limited to the sale of cattle for immediate slaughtering.

355. I suppose you would extend that recommendation to the whole kingdom?—Yes.

356. Would you forbid importation?—Certainly not.

357. Would you require the slaughter of all imported animals?—I think the slaughter of all imported animals would be practically tantamount to prohibiting importation.

358. Would you take any measures as to imported animals?—I would make every lot of animals that came out of a country where we know the disease to exist, for instance, from Galicia or Hungary, go into quarantine. The practical effect of that would probably be, that the importers would bring none from those countries; but such a result would scarcely interfere at all with the number of animals that are imported.

359. Do you mean animals coming by sea from those places you have mentioned?—They come across the continent by rail, and are shipped from Holland or Belgium.

360. Could you be always certain of tracing them?—Yes; they carry their own characteristics with them, and it could be easily ascertained whether there were any Hungarian or Galician animals on board the ship; and if not, the importer should be made to declare where they came from.

361. Is there any disease in Austria Proper?—I cannot say, but I think not,

362. (*Dr. Parkes.*) One can see that the general doctrine of the contagion of disease has had great effect upon your mind with reference to the Revel cattle introducing the disease; but can you furnish the Commission with a statement of all the positive instances of contagion which have occurred in this country, giving the precise dates, so as to have an account of the whole?—I do not think that this is possible, according to the returns that we have. I have endeavoured to obtain the most accurate returns, but I have failed to some extent in doing so. I shall be able I hope by the end of the week to give you the amount of loss in the country, and the number of cattle that have escaped which have been exposed to infection. I can give many instances of decided exposure, and the results, but not of all, that have occurred in the country.

363. The impression made upon your mind, I think,

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is, that in a vast number of cases the disease has been carried from the Metropolitan Market?—I have no doubt of it; I can give you many instances of that kind.

364. Do you believe that no hygienic conditions whatever affect the Rinderpest; suppose, for example, it is introduced into a stable in a good hygienic condition, and into another not in the same condition, would there be no difference in the two cases?—The disease has shown itself among animals which have been managed as well as they could be; and it has shown itself also among animals that have been as badly managed as they could be. The mortality has been just as great in the one case as in the other.

365. The rapidity of the disease and the mortality have been the same?—Just the same; the progress has been like the smallpox and other diseases of that kind. I saw some animals on Saturday last that were as well fed as they possibly could be, but the disease was making great progress among them.

366. (*Mr. Read.*) What was the effect of the first Order in Council?—I think to spread the disease rather more quickly than it would have been from the Metropolitan Market, as it called on cowkeepers to give notice of the existence of disease.

367. With regard to the system of inspection, you say that it is very inefficient in some of the outports?—The inspection at some of the ports has certainly not been so good as it should have been. I may mention that up to within a very short time there was no properly educated veterinary surgeon who was an inspector at the port of Harwich. The inspector there was what is commonly called a farrier or cowleech. I was at Harwich on one occasion, and I saw this man inspect some animals which had just arrived from Rotterdam; he stood by and merely saw the animals run past him.

368. When that inspection took place was it not as late as 10 or 11 o'clock at night?—It was late in the evening, it was on the occasion of the Essex Agricultural Society meeting at Harwich. I was there with some others; and when it was very nearly dark we went down to the pier, and saw this man "pass" many calves, pigs, and sheep; whether he knew who stood at his elbow or not I do not know, but when he saw us he stopped some of the animals coming across the bridge out of a vessel on to the landing place, and looked at them a little more attentively.

369. Was it not so dark that it would have been difficult to distinguish a bull from a cow?—I do not think it was quite so dark as that. Not more than three months ago the inspector at Newhaven was a butcher—whether the Customs authorities have appointed any other man now, I do not know, but the same imperfect inspection took place there.

370. There are very few, if any, cases of spontaneous outbreaks in the rural districts, I believe?—I do not think there are any. We may not be able to trace all the outbreaks to the introduction of the materies morbi of the disease; but in most of them it can certainly be traced.

371. Take the whole of the eastern counties, is it not very easy there to get at every case in which cattle from the Metropolitan Market have introduced the disease?—Just so.

372. You have referred to one case in Norfolk?—Yes; Mr. Leeds's.

373. Then the North Walsham District is the same?—Yes.

374. And that of South Norfolk?—Yes, the same.

375. In your opinion is it possible for the disease to be spread by means of flies?—I think it just possible that the disease may be spread through the medium of flies, from these insects alighting upon diseased cattle, and then going to other cattle at a short distance from them and alighting upon them. I think it is possible, but not very probable, that the disease may be conveyed in that way.

376. This day fortnight I saw a bullock dying from the Cattle Plague, and I should say that there was around that bullock, hanging in clusters, at least a peck of large bluebottle flies. Is it not possible that they might spread the disease?—Quite so, for the smallest amount almost of morbific matter would propagate the disease, and we can readily see that flies may take up an amount that would be perfectly effective for the purpose. I know that the disease may be spread by various indirect means.

377. When you speak of the Metropolitan Market being more healthy since the introduction of the railway system, would you not attribute that, in a measure, to the more rapid means of transit by railway as compared with the road, and not to the good management of the trucks?—Possibly so. I have never been able to trace any disease in animals as being caught in trucks; that is, not directly in dirty trucks; quick transit may have something to do with it.

378. Take the cattle coming from Norfolk to London, a journey which occupied seven or eight days before the introduction of railways; would they not be more likely to be in a diseased state than they are now at the end of so many hours?—Until 1839, when the so-called mouth and foot disease first appeared in this country, animals suffered no inconvenience so as to produce disease from being driven from any part of England to Smithfield Market; but when the mouth and foot disease appeared, it was found that animals, after being driven from different parts of the country, say from Norfolk, as soon as they came near to London sickened with this disease. I think it is not unlikely that the exertion which they had undergone rendered them more susceptible, and that they were brought more into the focus of the affection by coming near to London. If we look back to a time prior to the year 1839, when these special diseases had no existence here, we should not find that there were diseased cattle in the market from being sent by road from different parts of the country to London.

379. Would they be not more likely to take disease? We used to think that a bullock would shrink four imperial stones on the journey?—Yes; and long exertion would render the animal more susceptible of disease. We have a pretty good proof of that in the fact that if a man had 20 bullocks in Norfolk, and he selected 10 of them to send to the Metropolitan Market,—I am speaking now of the time before railways came into existence,—they would be affected with the mouth and foot disease on coming to the market, while every one of the animals from which they were taken at home would be perfectly sound.

380. Provided railways were properly managed, ought we not to have less disease in the cattle on account of the more rapid transit than in the old days when they travelled so far by road?—I think so.

381. With regard to quarantine for foreign stock, would it not be better to have slaughter-houses at the landing places than any system of quarantine?—Certainly, of the two things, it would be better; no system of quarantine for foreign stock, as a whole, can be practically carried out; but I would nevertheless make use of a limited quarantine as to animals coming from certain countries for the express purpose of preventing their coming at all.

382. (*Mr. Ceely.*) That would be indirect exclusion?—Yes.

383. (*Mr. Read.*) Would it not be better to kill the animals at once?—That might be the preferable plan.

384. (*Mr. Ceely.*) I suppose you do not consider that the disease has been propagated from the Metropolitan Market solely by the animals, but you would attribute some influence I dare say to the exportation of manure at the commencement of the outbreak. I have seen manure sent from cowsheds into the country, and I have known cows' legs to be found among them?—There is no doubt that a good deal of the disease that has appeared in the country has been due to manure which has gone from out of the

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cowsheds, and from knackers' yards, and from the Metropolitan Market. We have not been able to trace in all cases where the manure came from, but there have been many cases in the country which have been traceable to London manure.

385. Not more than a fortnight ago I knew of some manure being sent to Wendover in Buckinghamshire, and a cow's leg was found amongst it?—Yes; that is not an isolated case; there have been several parts of animals found in the London manure.

386. Would not that give rise to spontaneous generation?—The so-called spontaneous generation; it is merely transporting the seeds of the disease in another way.

387. (*Professor Spooner.*) Do you not think it probable that the disease may be conveyed by the inspectors themselves and other parties, from attending on diseased animals?—I have no doubt of it whatever. Disease has often been conveyed by one person going to look at a number of animals, and handling them, and then going off to some healthy animals at a short distance from the place.

388. During the time that this disease has raged in London you are aware that many persons from the country have visited us to inspect diseased cattle. Is it not probable that those persons may go back into the country and take the disease with them, and so infect cattle in their own neighbourhood?—If a man went from London, and the journey would not occupy more than about half a day, I can understand that he might take the disease with him if he went directly to look at any animals on his return; but supposing that a man came out of Yorkshire, and returned home late at night, and thoroughly washed himself, then I do not think there would be much risk.

389. Should you not think that such a means of conveying the disease has, in all probability, had an effect in those cases in which the disease has not been traceable to infected animals?—I have no doubt that if we could ascertain all the circumstances of every outbreak, and get at positive information, we should see quite sufficient to account for it without calling to our assistance spontaneous origin. I look upon it that the germ is indirectly communicated in some manner or other.

390. Referring to the transport of animals by railway, do you not think that if a truck-load of diseased animals were conveyed by railway, and it passed through a country where there were cattle, that the disease might so be communicated?—By the escape of the feculent matter falling down upon the rails, I can conceive that animals pastured near the railway might receive the disease.

391. You have stood by a line when a truck-load of cattle has passed, and you have no doubt noticed the effluvium which has been left behind?—Yes, many a time.

392. (*Dr. Playfair*). I think you stated that you thought bad hygienic conditions in the stalls occupied by cattle made them more susceptible to disease, although bad hygienic conditions might not produce disease?—There is no doubt that animals exposed to debilitating causes of that kind would be more susceptible to disease generally; but I wish to convey this as my own impression, that no bad hygienic conditions would produce Cattle Plague, and that if the disease were introduced into a shed or on to a farm where such a state of things existed, it would not be more likely to be fatal there than where the opposite state of things existed.

393. Are you not aware that the human plague attacked equally the well-conditioned and the ill-conditioned members of society, that the same measures as to confining the infected were adopted then, and yet that the plague visited us at least 15 times in one century; but after the hygienic and social condition of the population was improved it no longer entered the kingdom?—I think if we were more conversant with all the regulations that were brought into force to limit the plague, we should be less inclined to attach much importance to hygienic regulations in arresting its progress.

394. You are of opinion that improved hygienic conditions are not of much importance in regard to cattle?—No. I think you have misunderstood me. I am a great advocate for improved hygienic conditions as giving security against disease generally; and all I wish to say is this, that in my opinion, if we have the special germ of Rinderpest introduced into a herd of cattle that are well managed, and into a herd that are badly managed, the disease will be just as fatal and spread just as quickly in the one case as in the other.

395. The germ of the plague may be very often introduced into England with Egyptian cotton; the germ comes to England, but the improved hygienic conditions prevent its spread. Is it not therefore possible that if the hygienic condition of the cattle were improved the Rinderpest might be made as of little importance with regard to attaching itself to the soil of England as the plague of man now is?—I do not think that if the Cattle Plague is introduced into this country we shall be able to arrest it by hygienic regulations.

396. Have we not done so as to the human plague?—I cannot answer that question satisfactorily.

397. (*Viscount Cranborne.*) Do you know how far the season of the year and the temperature affect the progress and spread of Rinderpest in the countries where it originates?—(*Mr. Ernes.*) In the steppes it has very little influence; but when steppe cattle are travelling, and there is snow on the ground, the malady does not spread so much, on account of the cattle confining themselves to the road, from which they otherwise deviate in search of food.

398. That is so, is it, in Galicia and in the frontier countries?—That I could not say. I have obtained my information from others, and have not seen it myself; whether that is the case in Galicia or in Hungary I cannot say.

399. At what season of the year were you there?—In the month of May. The malady does not spread so fast when they are confined to the road as when they spread on each side of the road to feed; then they spread the disease very fast.

400. (*Chairman.*) You mean that the disease does not spread so much among other cattle?—Yes, and the steppe cattle, even when travelling, are not so strongly affected. It seems to be the special privilege of the steppe breed, that they do not suffer to the same extent as other cattle; for instance, where the steppe cattle would lose from 40 to 50 per cent., the others would lose from 80 to 90 per cent.

401. (*Mr. Read.*) (*To Professor Simonds.*) Do you find that there is any difference when cattle are attacked with the plague, whether they happen to be inhabitants of a London dairy or of a Norfolk marsh?—I have found no difference practically either in the progress or in the fatality of the disease. It has been just as fatal on the pastures of Norfolk as it has been in the dairies of London.

The witnesses withdrew.

Adjourned till to-morrow at 12 o'clock.

Tuesday, 10th October 1865.

PRESENT :

EARL SPENCER.	MR. READ.
VISCOUNT CRANBORNE.	DR. BENCE JONES.
MR. LOWE.	DR. QUAIN.
DR. LYON PLAYFAIR.	MR. WORMALD.

EARL SPENCER IN THE CHAIR.

Professor GEORGE THOMAS BROWN examined.

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402. (*Chairman.*) Will you state to what college you belong ?—I am a member of the Royal Veterinary College. I was for a great many years Professor at Cirencester College, and am now acting as the assistant inspector under Professor Simonds in the Veterinary Department of the Privy Council Office.

403. You state that you are an assistant inspector ; will you state how many orders of inspectors are there, and by whom are they appointed ?—There are, first, inspectors under the Order in Council, appointed by the Clerk of the Council ; secondly, inspectors under the Order in Council, appointed by the magistrates ; thirdly, inspectors of fairs and markets appointed by the mayor and corporation ; fourthly, inspectors of ports, appointed by the Board of Customs.

404. Are all these veterinary surgeons ?—The holders of these appointments may be veterinary surgeons, farriers, or cow doctors, butchers or others, who may be considered competent by the authorities by whom they are appointed.

405. Have you traced many cases of the disease in England where direct contagion could not be discovered ?—Yes ; I have found a great many instances where animals apparently have been quite isolated, and where notwithstanding they have fallen victims to the malady.

406. Will you state one or two of the most prominent cases ?—Some prominent cases occurred in Norwich. Mr. Ireland of Thimblethorpe, in the case mentioned yesterday by Professor Simonds, had six oxen in his own straw yard; the animals were bred by himself, they were never off the farm at all, and those animals were all attacked when I saw them ; some of them apparently were doing exceedingly well. I have not heard since whether they recovered or not ; there was no doubt about their having the disease. He stated to me that they had never been in contact with any diseased animals, and from the situation of the farm I have no doubt that his statement was correct ; but I was able to trace the original outbreak to a certain importation from the Metropolitan Market. Mr. Leeds of Whitwell had bought some Dutch beasts on July the 1st ; these animals apparently brought the disease into that part of Norfolk, and from that point we traced it to different distances of three or four miles ; but there could not be traced any direct contagion, no direct contact with diseased animals could be proved to have taken place. There are cases in London which I consider still more remarkable.

407. How far is Mr. Leeds's farm from Mr. Ireland's ?—Something like three miles. I do not think that there was any disease nearer than a mile and a half in a straight line from Thimblethorpe.

408. Were the sheds near a road ?—The straw yard was near a road ; but there was another yard by the side of it, through which the animals would have had to pass to reach a gate ; the outside of the straw yard was bounded by a wall, but it was tolerably high.

409. (*Viscount Cranborne.*) Did you make any inquiry as to the circumstances attending the first outbreak ?—Yes.

410. Had they known of any cattle passing along the road ?—In the case of Mr. Ireland they had not known anything of the kind, but it is quite certain that animals had passed along the road, because I traced several cases where diseased animals had been driven to and fro to the common. I ascertained that some animals belonging to small farmers had been driven night and morning along the roads in order to feed them upon the common.

411. Was that close to the shed where these cattle were kept ?—They were at some distance, but I merely mention the fact as an illustration of what was going on in the country.

412. Did you know that diseased cattle were passing along the road in this case ?—Not in this case ; we could not trace anything at all. Mr. Ireland was quite as much at fault as we were ; he had no idea of how his cattle became affected.

413. (*Mr. Read.*) Did you hear that these cattle of Mr. Ireland's had ever been to any pound ?—No ; he stated to me that they had never been off his farm.

414. Did you hear of any other cattle which had been in pound ?—No ; I did not hear of any.

415. The theory of it in Norfolk is that these cattle went to a pound, and that some horses which had been depastured in a field with some cattle which had died might have conveyed the contagion to the pound. Still you say that it was within a mile and a half ?—I think that a mile and a half was about the nearest point, as far as could be ascertained.

416. Had Mr. Ireland, or any of his attendants, been to see diseased cattle ?—The attendants did not admit anything of the kind. They would naturally not do so, as they would suppose that some suspicion would attach to them under the circumstances.

417. What is your theory as to the contagion being conveyed by flies ?—I think that it is quite possible. I have observed them around the eyes, where there has been a morbid secretion, in great numbers, and I also see that they have the power of penetrating the skin and drawing blood. I think that they might have the power of inoculating the animal, but of course it is merely a conjectural opinion.

418. Is it not possible to have it made a matter of experiment, as a few days ago thousands of flies were seen fastened to every dying bullock ?—If they were let loose in an enclosed place where bullocks were, it might be done, particularly if the flies were kept for some hours without food, but it never has been done.

419. (*Mr. Wormald.*) I do not exactly see how by turning a sound bullock into a place where there is a diseased animal, and there are a number of flies which fasten upon the sound animal which becomes affected, you are therefore to suppose that the flies have affected it, inasmuch as it is put into a place where an unsound animal has been ?—I understand it to be said that a quantity of flies were to be taken to a sound animal.

420. (*Mr. Read.*) In an unaffected neighbourhood ?—Quite so.

421. (*Dr. Jones.*) Have you made every inquiry as to the approximation of a diseased animal within a mile and a half ?—Yes ; I was running about the district to finish the inquiry, and I travelled 50 miles in a day with a pair of horses, and got back to Norwich at 12 o'clock at night. I made similar inspections in different parts of the country.

422. (*Viscount Cranborne.*) How long were you at this farm ?—I think about half an hour.

423. Did you go to Mr. Leeds's farm ?—That was

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the second inspection which I made; he gave me all the particulars.

424. It was the same day?—Yes. This case of Mr. Leeds is not a mysterious one. Mr. Leeds of Whitwell bought a lot of Dutch beasts from the Metropolitan Market on July the 1st. On July the 3d the disease appeared among them—all had it. Some of them gave evidence of great disease in the mouth; it was very extraordinary in that respect. Thirteen of these animals died, leaving 13 cases of recovery. Those animals were going on exceedingly well when I saw them, and I understood that they recovered subsequently.

425. (*Mr. Read.*) Can you see any reason for that unaccountable recovery of 50 per cent. in one lot?—No.

426. Thirteen out of 26 lived, I think you said?—Yes; all the animals were Dutch cows, and it has been observed that they do not succumb so readily as English cows do.

427. Out of the 26 animals which Mr. Leeds purchased on Norwich Hill which came from the Metropolitan Market 13 are alive now?—Yes, it is a fact.

428. And it is a most extraordinary fact?—Yes, certainly; those 13 animals all had the disease, I am quite clear about it.

429. (*Mr. Wormald.*) Did not you say that these animals were especially affected in the mouth?—Particularly.

430. Have you at all observed the disease with which cattle are attacked in the mouth?—I have observed the ordinary foot and mouth disease. I have seen some cases which I should not have distinguished from Cattle Plague if the head and mouth had been presented to me, and no other parts. I am speaking now with reference to the mouth, and judging by it alone, there are some cases which I saw last week where if the heads had been sent to me I should have called it Cattle Plague. The common foot and mouth disease is much more severe now than it has been known to be for many years.

431. And it similates this Rinderpest?—In that particular of the excoriation of the palate, which is very unusual in foot and mouth disease, but is very frequent in this disease. Nevertheless, we have had animals die in large numbers perfectly free from any mouth disease.

432. (*Chairman.*) Will you name some other cases which you consider mysterious?—There is the case of a man in the Euston Road having one cow; he was a cabman, and he purchased a cow in order that his wife might keep a small dairy; that animal had been in their possession for three months, and was in a very large well-ventilated shed capable of holding six or seven animals; the cow was in very good condition, and had never been off the premises. The animal was attacked on September the 9th with preliminary symptoms; they were exceedingly slight; it was sent to the college, and on September the 12th it was dead, the disease being suddenly fully developed, and the progress of it being very rapid.

433. Was the stable where the cow was first housed at all near any other cow sheds?—No, not within some 200 or 300 yards; it was quite isolated; it was in a street leading through a gateway 200 yards back.

434. There was no drain communicating from one to the other?—No, certainly not. It was as isolated as any case could possibly be of that kind.

435. And when the cow was removed to the Veterinary College was she placed where the diseased cows or bullocks were?—She was placed in a part set aside for the reception of these animals.

436. (*Viscount Cranborne.*) The whole had disease?—Yes; that cow died three days after she was admitted. The disease was very rapid.

437. (*Chairman.*) Then it is possible that she might have caught the disease at the Veterinary College?—I think not, considering that on the following day she was bad, and died two days afterwards. When I saw her I was satisfied that she had the malady in the early stage. Miss Burdett Coutts' and Lord Granville's cases were not to be traced to any direct contagion.

438. (*Dr. Jones.*) Is it true that no positive contagion has been found in the case of Miss Burdett Coutts' animals?—Not directly by the contact of diseased cattle. I think that there is a way of explaining it by the possibility of other animals, sheep or dogs, which had been with infected beasts, coming in contact with them.

439. Have you any good ground for your conclusion in that case?—Certainly. In Miss Burdett Coutts' case there were 20 head of stock which were kept in the pastures, which are quite private; but I ascertained that some time before the outbreak they had been in the habit of allowing some persons connected with a school in the neighbourhood to place sheep there, these sheep having been some five or six times in the Metropolitan Market. That was all the evidence which we could collect in that case. The cows were feeding in the field next to the sheep, and were separated only by a wire fence. We were compelled to conclude that the cattle had received the contagion from the sheep, or that men who had been in contact with diseased animals had been upon the premises, but that was contradicted, because the premises were strictly private.

440. (*Chairman.*) When did the first case occur among the cows?—The first case occurred on July the 27th. On the 29th one animal died. From that time, at intervals of a few days, the whole stock were attacked, one or two at a time, and unfortunately the whole died, one or two at a time, or were killed; four or five were killed when I first inspected them.

441. Can you give the date when those sheep were in the Metropolitan Market?—I do not know the dates when they were there, but it was stated that they had been there five or six times and not sold, and that they had been driven back; in fact they had been in the habit of allowing these people to place their sheep there in a field which was only separated by an open wire fence.

442. It was within a fortnight of the seizure of these cows that these sheep had been in the Metropolitan Market?—They had been in the habit of going every market day, and up to the time when the animals were attacked the sheep were still there.

443. (*Mr. Read.*) If they had been at the Metropolitan Market you would think it quite probable that the sheep communicated the germ of the disease to the cows?—It is quite probable. There are many outbreaks which we can trace in no other way except that sheep in the Metropolitan Market had been brought in contact with cattle, and the cattle subsequently suffered from the Cattle Plague.

444. (*Dr. Jones.*) The sheep having no signs of any disease?—The sheep having no indication of any disease whatever, and the same thing of course would apply to men. It is asserted by continental authorities that even dogs have been known to carry the infection.

445. (*Dr. Playfair.*) Have you not an instance at the Veterinary College of a sheep which remained in health having affected a calf with which it was put in contact?—I do not think that a good case; the sheep was placed with a diseased cow, and was returned to the shed; the calf was taken ill three or four days afterwards, and died. It is doubtful whether the infection was received from the sheep or from the diseased cattle around.

446. (*Viscount Cranborne.*) In many of these cases did you inquire into the source from which the water came which the animals drank?—Yes.

447. And it was connected with the cases where the disease had broken out?—In Lord Granville's case it certainly was not connected with it. The water came many miles through iron pipes.

448. I suppose that the iron pipes would not destroy the infection?—No; but one could not suppose that the virus would filter through the soil.

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449. In any case did the animals drink running water at a river, or was it generally from wells or ponds?—It was generally from wells or ponds, except in the marshes, where there are dykes.

450. (*Mr. Read.*) In the case of that fortunate cow at the College were any precautionary measures taken?—None whatever. The calf resisted the infection for about two months and then died, but the cow has survived.

451. The cow is not a steppe cow?—No.

452. (*Chairman.*) Did you know of diseased cattle being near Miss Coutts' cattle before they took the disease?—There were a great number of them about three quarters of a mile away. Miss Coutts explained to me that the disease began a short time after a thunderstorm when the wind blew from that direction. Her theory was that the disease began in that manner.

453. What is your opinion upon that point?—I prefer the sheep to the wind, though I do not see why the atmosphere should not convey the disease to a limited distance.

454. (*Mr. Wormald.*) In Miss Burdett Coutts' pastures are there opportunities for the cows to avail themselves of perpetual baths, as we know that they do in hot weather, or can they only drink from tanks?—They can only drink from tanks.

The witness withdrew.

Professor GERLACH examined.*

Professor Gerlach.

455. (*Chairman.*) Professor Gerlach, you are, I think, a professor of veterinary science in Hanover; will you tell us what you have seen of the disease which now prevails in this country? Have you seen it in any part of Prussia?—I am a professor in Hanover, and Director of the Veterinary College there. I have seen the Cattle Plague in Hungary, and lately in Holland. In Prussia it sometimes occurs, but only in the border provinces, and it is soon extinguished there. I have lately been in Holland, in Schiedam. I was sent thither by the Hanoverian Government to acquaint myself with the disease and the remedies employed. Its first appearance in Holland was in the beginning of August. A tradesman in Rotterdam bought cattle, and sent them to market in England. He did not succeed in selling them; he kept them for some eight days, and sent them again to market. Not being able to dispose of them, he took them back to Rotterdam. Being a tradesman, and engaging in this transaction as a speculation only, he had no lairs, and he sent them into the country to a place called Kethel near Schiedam; they fell sick within a few days. The nature of the disease was at first mistaken. The diseased cows were partly sent to Rotterdam to the market, and there slaughtered; others died. The farmer who took charge of these cattle had also a herd of his own. Those cattle which he received were kept in a lair, his own were feeding in a meadow 1,000 paces off, and among the herd which was feeding at this distance the complaint broke out, without any contact with the cattle in the lair. The herd so infected was pastured in a long meadow which was in contact on both sides with many other strips of meadow abutting on it, each of which contained cattle, so that by this means more than 20 herds of cattle were infected. The market was being held in Rotterdam at the time when this disease broke out, and from this market the disease appeared to have spread through the whole province of South Holland.

456. (*Dr. Playfair.*) Is it very extensively spread through Holland at present?—In South Holland it has extended so widely that it has been found necessary to close, with the exception of a few small districts, the whole of South Holland, taking the natural boundaries, canals, rivers, and so on, for the purpose of extinguishing the disease.

457. Has it not passed into North Holland at all?—The other Dutch provinces, not relying upon the precautions taken for South Holland, have adopted or are adopting like precautions for themselves. North Holland has surrounded itself by a military cordon. Some week or ten days ago, when I last heard, the provinces of Utrecht and Guelderland were considering the same thing. The effect of these measures has been that the disease has only in three cases overstepped the frontier of South Holland, once in Amsterdam, and twice in other places which I do not now remember; and in these three places it has been extinguished by promptly closing up the place where it occurred.

458. Did they slaughter all the cattle in the infected districts?—The measures adopted with respect to these districts have not been sufficiently stringent. The Government has left it to the communes or localities and to the authorities of those localities to carry out what measures are thought expedient. They have established a Commission in Schiedam, consisting of some veterinary surgeons, and have as far as possible sent veterinary surgeons through the country to be of use when called in; but the local authorities are sometimes lax and sometimes active; sometimes they let the animals live or die, as it may happen, and many of these diseased animals are exported, and in many cases have been exported to England.

459. To the London market?—To the London market.

460. (*Mr. Read.*) Is there any prohibition of exportation?—Exportation by sea is not forbidden. Exportation to other Dutch provinces is prevented; but within the district so shut up the cattle are allowed to be sold or slaughtered, and to be exported abroad. They are only when slaughtered examined by a local authority, who decides whether they are fit for food or not.

461. Has Belgium taken any precautions against the disease?—I have not been in Belgium, so that I cannot say what has been done there. I intend to return by Belgium.

462. (*Mr. Lowe.*) Speaking of the disease in this country, have you seen the nature of the disease itself, and what would you suggest to us under the circumstances under which we find ourselves? I do not know whether you have been long in England, or elsewhere than in London?—I have been now but five days in London and its outskirts. I have been several times before in England. I was here in the Exhibition year. The scientific principle is, first, that in Germany and in England the disease commences and propagates itself only by contagion, and in the second place that it can only be got rid of by absolutely preventing the extension of this contagion—by preventing the contagious matter from spreading. This contagious matter is so volatile and so concentrated that there is nothing else to be compared to it. In order to extinguish it, therefore, it is necessary that the diseased cattle and their excretions should be absolutely shut off from the healthy. Where the district is small there should be a total inclosure of the district itself. It is necessary that in the places where these measures are employed the disease itself should be put an end to as rapidly as possible, because if they are long continued it is found impracticable to carry them out strictly. With precautions of this nature such a relaxation comes inevitably in time. For this purpose, for putting an end to the disease where it exists, there are three means. First, the slaughtering of the cattle; but this only where by destroying the cattle you can destroy also the pest. When it is confined to a small space, as to a single herd, and that not of very large extent, the slaughtering of the cattle is the best and

* Professor Gerlach, not understanding English, was examined through the Secretary.

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the most effectual means. In the second place, those cattle which have not yet caught the disease should be immediately sold for slaughtering. The meat of the cattle so sold may be eaten unconditionally, experience having shown that the flesh even of diseased cattle is not directly injurious to health.

463. (*Viscount Cranborne.*) What is the meaning of "directly?"—If the meat has become corrupted it is of course injurious to health; but the mere fact of disease, as far as we have been able to observe, has never produced injurious effects at all upon the human subject.

464. (*Dr. Playfair.*) In all these remarks you refer to cooked flesh?—Yes. Thirdly, no cattle should be allowed to be exported from the place in question. Or exportation may be permitted only on railways, and perhaps accompanied by inspectors, and only to places where the cattle will be sold for the purposes of slaughter.

465. (*Viscount Cranborne.*) Do you consider that inspectors can always tell whether an animal is in a condition to carry infection or not?—I think that they can.

466. (*Mr. Lowe.*) What is the use of shutting up particular districts if you would allow cattle to be sent out of them for the purpose of being sent to market and slaughtered there?—The most complete and effectual measure, no doubt, is to close completely the infected district, and to slaughter the animals which are there; but I am convinced that the transport of animals reported sound, under proper control, along the great railways to markets where they would be sold for immediate slaughtering, may take place without danger. A further means of shortening the period for destroying the Plague in an infected district is inoculation. Experience shows that in many cases as many animals die which have taken the disease by inoculation as those which have taken it by contagion, but it is generally much milder, and the proportion is never greater. The effect at the same time is to accelerate the process of the disease, so that a district through which the disease would take a quarter of a year, or perhaps half a year to travel, receives the disease completely in eight days, and the loss is not greater, and generally much less.

467. (*Chairman.*) Is inoculation practised to any extent in Prussia?—The disease has never been allowed to extend so far as to render this advisable. Where the district is small the disease can be more readily extinguished by more violent measures, by absolutely closing the district, and slaughtering the animals. Inoculation is useful in the case of a large district where such wholesale slaughter would be perfectly impossible.

468. (*Dr. Playfair.*) Is inoculation practised in Russia?—Inoculation was practised on a considerable scale formerly in Germany and Denmark in the beginning of this century and in the last century, and it has been practised lately in Russia to a considerable extent, with good results. It is at present contemplated to introduce inoculation into the steppes, and to inoculate all the cattle.

469. (*Viscount Cranborne.*) Has that received any approbation from the Russian Government?—It is a scheme suggested by Professor Jessen, a Professor at Dorpat, and the Government has given its sanction to its being introduced within several districts. The measures which I have mentioned are the only measures that we know of by which the disease can be extirpated.

470. (*Mr. Read.*) Has the disease been known to exist in sheep on the Continent?—It has been observed in Hungary and in Austria that the Rinderpest attacks sheep as well as cattle. The same thing has been observed in Italy two years ago, and in Sardinia, that it attacks both sheep and goats. The susceptibility of sheep is much less, however, than that of cattle, so that sheep often escape the effect of contact when cattle would not. It is also usual for the pest to be milder in the case of sheep than it is in the case of cattle. I observed when I was over in Schiedam that some sheep were ill, but it had not been observed by the Commissioner there. I was so much struck with this that I requested the Commissioner to allow me to inoculate, and I did inoculate, some sheep, and I observed that they all took it mildly.

471. (*Dr. Playfair.*) Have you done the reverse; have you inoculated cattle from sheep?—I have not had time as yet to inoculate cattle back again from sheep; but it has been observed in former times that the cattle do take the disease from sheep by inoculation; it, however, is not so easily taken by them from sheep as by inoculation from cattle.

472. Is it known to be milder when the disease has been communicated from sheep to cattle?—Observation has not proceeded so far. It is only ascertained that cattle can take the disease from sheep, but whether the infectious matter becomes milder in its operation, by passing through the sheep, has not yet been ascertained.

473. What matter do they use for inoculation?—Either the running from the nose, or the running from the eyes, or the saliva: never blood.

474. Do they ever use the excrement?—It is known to be contagious; but I do not know whether the experiment of inoculation with it has been made.

475. You have told us what you would advise in this country; will you be good enough to tell us precisely what the measures taken in Prussia are? Have you yourself personally seen those measures applied?—I have not; but I am well acquainted with them, for I myself was one of those who prepared a scheme for them in Berlin. The locality where the disease exists is immediately closed up, and the cattle in it are slaughtered, if they are not too numerous: there is a maximum number fixed by law; the limit is 10 or 12, but that limit is not observed, provided the herd be not too great; supposing it to be 20 or 30 only, the whole are slaughtered.

476. Supposing the number of the cattle to exceed the limit, what is the extent of the cordon which is drawn round them?—The whole district where the disease is found to exist is so closed without regard to its extent.

477. Is it an administrative division?—That is regulated by the judgment of persons who understand the subject, and care is taken not to make the district so closed larger than is absolutely necessary.

478. Can you state the largest area that has ever, within your experience, been treated in this manner; a whole province for instance?—Since the close of the war in 1815 no such district so large as the whole of a province has been so closed; but districts of considerable extent, such as of several German miles square, have been closed; it has not been found necessary to go further.

479. Will you state to the Commissioners how this closing of a district is carried out; is it with the aid of the troops, or by the police?—When the danger is great it is done by the help of troops, but in ordinary cases it is done by placing watchmen on the high roads and principal communications, inspectors appointed for the purpose in the chief towns or places seeing that the proper measures are carried out. In ordinary cases it is not usual to kill all the cattle; when the herds are very numerous it is usual to kill only those that are diseased, and not those that are sound. The ordinary period of incubation is seven days. When a period of two or three weeks elapses without any outbreak of disease, the danger is deemed to be at an end; every place, such as the stalls and so forth, is disinfected, and the district is then thrown open; the period of incubation is generally from five to seven days, though in rare cases it may be more.

480. Have you personally seen so few days elapse as from five to seven days?—Yes, I have.

481. Is the district so shut in that there is not any exportation of cattle, even for slaughter?—In Prussia it is absolute; no cattle are either exported or imported; they are not allowed to be imported, because the importation of fresh cattle extends the disease,

and the fresh cattle take it, and it so prolongs the evil.

482. Does the Government, or does the province, pay compensation to the owners for the beasts that are killed?—The province, not the State, pays compensation for healthy beasts that are killed in order to arrest the progress of the disease; it pays for the healthy animals, but it does not pay for those that are slaughtered being diseased.

483. Are those measures always effectual?—Always; in a few weeks or two months at the utmost the plague disappears.

484. So effectual that the plague never travels from the eastern parts of the kingdom to the western parts of the kingdom?—Since the war with France it has never appeared in Brandenburg. When it has broken out in Poland it sometimes appears in Posen, in Silesia, and East Prussia, but it has never advanced as far as Brandenburg.

485. Is it your opinion that this disease is always propagated by contagion; have you ever heard of its having broken out spontaneously?—Never; the disease has always been propagated by contagion alone.

486. Have those methods which you have described of putting an end to the disease been long in practice in Prussia?—Yes, they have been put in practice from time to time, during the whole century, ever since the war which ended in 1815.

487. (*Viscount Cranborne.*) How do they induce the farmers to give notice of the fact that the disease has broken out among their cattle?—Along the whole Russian frontier there is a strict quarantine as regards the steppe cattle, a species well known, and they are not allowed to pass the frontier without undergoing the quarantine of 21 days; if a single steppe oxen passes the frontier, even in a large herd, it is stopped and sent back to undergo quarantine.

488. (*Dr. Playfair.*) Is that regulation carried on with all Russian cattle, or only with the steppe cattle?—It is not practised with regard to all. If disease exists in the border provinces of Russia, then quarantine is maintained for all cattle, whether steppe cattle or not.

489. (*Viscount Cranborne.*) But I wish to know what means are taken to discover whether the disease has broken out or not?—As soon as any outbreak of the disease is heard of, the strictest investigation is made; in some cases by a legal proceeding, and in other cases without a legal proceeding, and all persons having any knowledge of the matter, the owners and herdsmen, and others, are strictly examined, in order to find out the manner in which the plague has been introduced.

490. (*Dr. Playfair.*) Is any severe punishment inflicted upon a man who purposely conceals the disease?—If it is found out that he has kept it secret, then he is severely punished; but the general feeling of the country is such that it is always told. In Austria the disease is very much more frequent than it is in Prussia; but in every individual case where it has broken out in Austria, it has been traced to the steppe cattle.

491. (*Chairman.*) Have they not the same regulations in Austria as they have in Prussia?—Exactly; the reason that the outbreaks are more numerous in Austria is that they import more; but the regulations are exactly the same.

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492. (*Viscount Cranborne.*) Is the quarantine of 21 days not always effectual?—Cattle are smuggled across sometimes.

493. (*Dr. Playfair.*) Are those measures which you have mentioned extended to men attendant upon the cattle as well as to the cattle themselves?—The cattle are strictly prohibited from quitting the district, and more recently sheep have been also so prevented; and the herdsmen, who are attending upon the cattle, are not allowed to go out to the other districts; other people are.

494. Are those measures willingly assented to by the farmers and peasants of the country?—They are; and the best safeguard is generally found in the precautions which are taken voluntarily in the neighbourhood itself, and even in the districts so closed up. It has sometimes been known that individuals have, by strictly shutting up their own farms, preserved their own cattle within the cordon from any infection.

495. What are the disinfecting means which they rely upon?—First, they rely upon thorough purification with soap and water; secondly, they use chloride of gas to get at all the corners of the stalls, and they also use chloride of lime to disinfect the other parts. Then, with regard to the dresses of the men who are employed, woollen and other similar materials are put into an oven and heated to about the temperature of boiling water.

496. Will you state what they do with the hides?—The hides of the diseased animals are slashed and then buried; the straw and the litter are all burned; they do not attempt to disinfect them.

497. (*Chairman.*) Is the spread of the disease greater in hot weather than in cold weather?—It is worse in cold and in wet weather, and better in warm and dry weather.

498. Are the cattle housed properly in the cold weather?—The cattle are all housed; but they have not so much fresh air as if they were in the fields.

499. (*Dr. Quain.*) Under what circumstances are the hides preserved for use, or made use of?—There is no danger if the hides are taken when they are perfectly dried, and carried straight to the curriers; there is then no danger; but if they are carried about wet and damp, there might be some risk; they might be carried freely anywhere when they are once properly dried, and if they are to be carried far it is a matter of prudence that they should be so dried.

500. (*Mr. Read.*) Have you heard or known of the existence of Rinderpest at the present time in any parts of the Continent except South Holland?—I know of no part of the Continent where it now exists, except in Holland, Belgium, and Hungary.

501. (*Dr. Playfair.*) Are you a medical man, as well as a veterinary surgeon?—Yes, I am.

502. Is it your opinion that this plague has solely originated with the steppe cattle?—Solely.

503. When you speak of the steppes, do you mean the steppes of Podolia and of the Ukraine?—I was referring, not to Russia in Europe, but to the Asiatic steppes; there, as far as we can hear, there is always more or less of it.

The witness withdrew.

Mr. JOHN HÖNCK examined.

Mr. J. Hönck.

504. (*Chairman.*) I believe you deal in cattle largely?—I sell on commission in the Metropolitan Market.

505. Do you send, yourself, for cattle from abroad to come to England?—No, not generally; the cattle that come from abroad come in consignments by various parties to us, and they are delivered in consignments of from one to 100 or 150.

506. You do not yourself order cattle to come from any foreign port?—Not generally; I have done so, but that is not the usual course of business.

507. Do you carry on business alone, or are you connected with any other gentlemen?—I have a partner.

508. Will you be good enough to state who your partners are?—Mr. E. Mertens.

509. Are you in partnership with Mr. Baker?—No.

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510. You constantly have, I suppose, foreign cattle consigned to you ?—Yes.

511. Have you often had Russian cattle consigned to you ?—No.

512. Are you acquainted with the case which has been talked about a good deal, called the Revel case ?—Yes.

513. Some cattle were consigned to you ?—Some cattle were consigned to me from Revel in the month of May last.

514. By whom were they consigned to you ?—They were consigned by Messrs. Clayhills and Son of Revel.

515. Will you state what occurred with regard to those cattle ?—I will. Last summer I became acquainted with an individual of the name of Burchell, and he stated that he believed there was some good to be done from Russia, and that he was going out there. I said, "Very well." Then he said, "I have "not the means to carry on the trade myself, but if I "find that things are promising, perhaps you will "assist me to import cattle from that place." I said, "If you go and see I will hear what your report is "first." He went, and came back again in about October, I think it was, September or October, and his representations were of such an extraordinary character as to the cattle that they had in those districts, and he made out the business in prospect to be so profitable, that a friend of mine, Mr. Baker, and myself were induced to come forward to carry out the contract which he represented he had made with the landowners in Esthland. That is how the business was first introduced to me.

516. Will you state what steps you took to carry out this arrangement ?—He then stated that it would be necessary to lodge 1,000*l.* in the hands of Messrs. Robinson and Fleming here as a guarantee that the contract should be carried out; but as I did not know anything about the parties, I was unwilling to part with my money before I had a full guarantee that they were respectable and responsible persons, and I did not do so. He said, "It will not matter if I go "back again, the persons will be quite satisfied with "my being there, and they will be equally inclined "to deliver the cattle when the spring comes." So he went back again, and I supposed that everything was going on all right, and that the cattle were coming in such splendid condition as he represented them to be in. From the notice I received that the cattle were ready, I sent a steamer over called the "Tonning" to Revel, in the month of May last. She started from London on about the 9th or 10th of the month, and arrived there on the 16th or 17th of May.

517. Had this vessel been previously engaged in the cattle trade ?—Yes, continually, she was built for the cattle trade, and we are always bringing cattle by her. She arrived at Revel on the 16th or 17th, and she left again on the 23d, with 321 oxen and 330 sheep; these cattle were received by this Mr. Burchell who was out there at the time.

518. Can you state how these cattle were collected ?—They were collected in the neighbourhood of Revel from the different landed proprietors in Esthonia, within I suppose about 100 miles of the place.

519. Did they all come from Esthonia ?—Yes, all of them.

520. Did none of them come from St. Petersburg ?—No, not that I am aware of, or ever heard of, and in fact I am positive that there were none which came from St. Petersburg.

521. What class of cattle were they ?—They were cattle which had been worked, and they were rather in a low condition; but so far as I could judge and see they were very sound indeed. I never saw more sound cattle in my life from anywhere.

522. Were there any from Courland ?—Not that I am aware of. I had rather short notice, or else I could have been prepared with documents, and could have answered you fully upon all these questions. I can give you the data, if you please, later.

523. It is very important, if you will be good enough to do so ?—I do not believe that there were any except from Esthonia.

524. Were all the cattle in a healthy condition when they were put on board the vessel ?—I believe so, fully, because they were very healthy when I saw them when they were landed here.

525. Where did the sheep come from ?—I believe they all came from that district.

526. When they left the port were they inspected by any Government officer belonging to Russia ?—I do not think so.

527. After leaving the port did they touch anywhere on their road home ?—The vessel touched at Copenhagen.

528. For what purpose did she touch there ?—To take in water; and there was also an order sent by our brokers that if they could ship 40 more cattle at Copenhagen without delay they were to do so, because there had been an application of that sort to ship cattle at Copenhagen for London.

529. Did they do so ?—No; they did not get any cattle from Copenhagen.

530. Were any orders sent to Copenhagen with regard to the destination of the "Tonning ?"—Yes; when the cargo was first ordered she was ordered to bring the cattle to Lowestoft, but afterwards it was altered to Hull, because I was so utterly in the dark about the quality of the cattle, as to what they were, and I received one or two telegrams from Mr. Burchell which I could not make out, to this effect: he said that the landed proprietors were cheating him, and that the cattle were in a very lean condition and quality, and that induced me to send them to Hull, partly because I thought that in the northern districts there would be a better market for lean cattle, and also inasmuch as I did not know anything at all about whether these cattle on the voyage, as they often do, might not get the foot and mouth disease, for in Hull they have never taken any notice of that, but in London and Lowestoft they are very particular, and they will not admit any cattle which have the foot and mouth disease.

531. In using the word "they" do you mean the veterinary inspectors appointed by the Customs ?—Yes.

532. They are more lax at Hull, are they ?—Yes, they are, in regard to the foot and mouth complaint. We have always had them passed coming from Hamburgh with the foot and mouth disease at Hull, whereas in London they would never pass one head.

533. Were any of the animals sick on their passage to Hull ?—I have heard that one of them was. Mr. Burchell related that it was so, but that is not at all an uncommon occurrence; they often die on the voyage without anything at all being the matter with them when shipped.

534. The animal that was sick did not die ?—No.

535. On their arrival at Hull what became of these cattle ?—On their arrival at Hull I put them in the hands of a Mr. Coulson, and he sold 106 of them, to the best of my recollection, there, to go either to Derby, I think it was to Derby, or to Leeds.

536. (*Dr. Playfair.*) Did they not go to Manchester ?—No; I do not think they went to Manchester. Mr. Coulson sold 106 of them, and 40 were taken by another gentleman, Mr. Hickman, to Manchester, and they were sold there.

537. Mr. Coulson sold 106 for you; what became of them ?—That I cannot say, but they were sold to dealers.

538. They were sold to Mr. Lambert, were they not ?—I believe they were sold to Dickenson and Derby.

539. (*Chairman.*) You are now speaking of the 106 ?—Yes.

540. And Mr. Hickman bought 20 or 40 others ?—Yes; he took 40 to sell at Manchester, and he sold them at Manchester.

541. For what purpose were those animals sold,

for slaughtering or for grazing ?—I believe they were all sold for slaughtering.

542. Have you been able to trace any of those animals since they were sold ?—No ; I have never heard anything more of them at all.

543. What became of the remaining 175 ?—The 175 came to London, and they were sold on the Thursday following, after they had arrived here on the Tuesday night.

544. What was the date of their arrival at Hull ?—They arrived on the 29th of May.

545. On what day were the 146 sold ?—On the 30th.

546. Were they sold from the ship, or did they go to any lairs ?—I am not sure whether they were not sold on the same day when they were landed.

547. When did the 175 arrive in London ?—I suppose it must have been on the following day.

548. On the 31st of May ?—Yes.

549. Where did they go to in London ?—They went to my own lairs in York Road, close adjoining the Cattle Market.

550. What became of the 175 ?—They were sold for killing, excepting the 20, which Mr. Baker sent on the same day, no, on the following day, when they arrived, Wednesday, to Gosport.

551. The 20 were sold on the same day as the rest ?—On the day before the market.

552. What was the date of Thursday ?—The 2d of June.

553. The 20 were sold on the 1st of June, and the remainder were sold on the 2d of June ?—I am not quite certain as to the date, but it was on a Thursday, and those 20 were sent down on the Wednesday, the day previous to the market.

554. Who purchased those 155 animals ?—A variety of butchers in the metropolis.

555. Do you know the names of the purchasers ?—I remember several of them, but I sent to Professor Simonds a whole list of them.

556. Will you look at that list (*handing the same to the witness*), and see whether it is correct ?—Yes, it is perfectly correct.

557. What became of those animals ; were they all slaughtered ?—Yes, they were all slaughtered immediately.

558. Did you ever afterwards trace them individually or in lots ?—No. I merely asked people the question whether they found them all sound and right, and I received an assenting answer in every case.

559. Did you see all the oxen ?—Yes, I saw them all.

560. Did they appear to you to be in a healthy condition ?—They were old-worked oxen, and they are sure to be healthy, and if any cattle can stand a journey it is the old ones, they can stand a journey better than the others.

561. What became of the sheep ?—They were also sold by Mr. Coulson to some parties, I believe Mr. Dickenson was one ; they were sold at Hull.

562. They were all sold by Mr. Coulson at Hull ?

563. For what purposes ?—For killing purposes.

564. Do you know where they went ?—I cannot say.

565. Are you in the habit, after a vessel has brought a cargo of cattle to England, of using disinfectants ?—Always ; we use the chloride of lime very freely on board.

566. Previously to the outbreak of Rinderpest in England was it your custom to do so ?—Yes ; but not so much as since that, I believe, because the supervision of the Customs authorities is very strict, and they would compel any shipowner to do it who did not do so.

567. Would they act in the same way at Hull as in London ?—I have no doubt they would.

568. Have you used the "Tonning" since she brought in this cargo ?—Yes, every week.

569. (*Dr. Quain.*) And the week following ?—Yes.

570. (*Chairman.*) When did she start on her next trip after coming to Hull with these cattle ?—I think almost immediately after she came with a cargo from Revel ; she came round to London, and there were certain repairs done to the engine, and after that she started for Tonning.

571. How soon after her arrival at Hull did she start on this fresh trip ?—I think within a week, but I cannot speak positively.

572. Did she return immediately with cattle from Tonning ?—Yes, immediately.

573. (*Mr. Read.*) What was the average price of these cattle ?—As nearly as possible they made 12*l.* each, or between 11*l.* 10*s.* and 12*l.* each.

574. How old were they ; you say that they were old cattle ?—I should judge that they were six or seven or eight years old ; not less than six years old, certainly.

575. What colour were they ?—All colours ; they were black, and black and white, and red and white.

576. Had you ever seen any cattle like that before ?—Yes, I had.

577. Constantly ?—Not often ; there never had been any direct from that part before. I believe there had been a few imported by way of Lubeck some years ago.

578. You have not seen any of them lately ?—No, not lately.

579. You are no doubt accustomed to see all sorts of foreign cattle ; do you know whether any cattle are sent to England from Austria or Hungary ?—Yes, large quantities are sent every week.

580. From Hungary ?—Yes.

581. (*Dr. Playfair.*) Every week ?—It is rather difficult to define where they come from, but we call them the Hungarian breed ; they are a kind of white ; all the cattle have large horns.

582. (*Viscount Cranborne.*) With black hair under the belly ?—No ; these are white entirely, a kind of grey colour.

583. (*Mr. Read.*) In your opinion are the foreign cattle which are imported as healthy as our own ?—I think so ; and in fact the examination at the waterside by the Customs authorities is so strict that it is impossible to bring diseased cattle in; in fact the other day for one single animal the whole of a cargo was stopped. It has been so in the past also. The surgeons have been very rigorous in their duty.

584. What is the average age of the cattle that are imported ; I do not mean from Holland, but say a district as far off as Austria or Germany ?—I should say that they were between four and five years old.

585. You do not receive small animals from those districts ?—No.

586. The young foreign stock comes mostly from Holland ?—Yes.

587. Is there not a very considerable number of cattle for slaughtering purposes imported from Holland and sold in the Metropolitan Market at different times in the year ?—This year there have been comparatively very few, but in the last year there was an enormous quantity every week.

588. Of your own knowledge you are not aware that these Dutch cattle are particularly liable to pleuro-pneumonia when they arrive in this country ?—Not more so than other animals.

589. You do not know that it is so ?—No ; I should be very cautious about it ; but I should say that those young cattle are more subject to pleuro-pneumonia than other cattle after having gone through the sea voyage.

590. (*Dr. Quain.*) Is Mr. Burchell a person who is accustomed to deal in cattle, or can he be considered a judge of the health and condition of cattle ; is it possible that he could have bought sickly animals or steppe cattle ?—He must have known it if there had been any disease ; he was there all the winter, and he wrote various letters to me about the prospect of the trade, and he must have mentioned it if there had been any disease in the country.

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591. Do you think his knowledge was such that it would have prevented him from buying any diseased cattle ?—Decidedly.

592. Are you acquainted with all the particulars of what occurred at Revel when these cattle were purchased ?—Yes ; I think so.

593. Do you believe that they might have consisted of two sets of cattle, one set consisting of only 13 selected from a particular herd, of which the rest were rejected, and the others obtained from a totally different source ?—I believe there were some of them found to be too low in condition which he objected to on that ground, because he was afraid that when he came here with those cattle I should find great fault with him, and not without reason, after the representations he had made.

594. Have you any reason to suppose that those animals that were low in condition came from a different source, and were not of the same character as the Esthonian cattle ?—No ; these cattle all came out of Esthonia. I saw a gentleman who came from that district, and he told me that they all came out of Esthonia ; they were collected there from the various landed proprietors.

595. Are you aware that any of the cattle in that transaction were killed before the others were shipped from Revel ?—One I believe was, because it had broken its back ; it was lame.

596. Are you quite certain that it was an accident ?—Yes ; I think so. At least I have Baron Girard's letter for it.

597. Did it appear that more than one of them was killed ?—I never heard of any more.

598. (*Dr. Playfair.*) Have any representations been made to you by the purchasers at Hull that the cattle were in a bad state ?—None whatever. I never heard anything more about them.

599. With regard to those that were sent down to Gosport, was it ever represented to you that they had introduced the disease amongst the cattle at Gosport ?—No ; I never heard anything about them. They were inspected by the Government inspectors, and of course it did not concern me, inasmuch as I sold them to Mr. Baker, and, therefore, I was not likely to hear anything more about them.

600. You stated, I think, that one animal being ill in the passage across is not at all an uncommon thing ?—Not at all ; we have them die often, although they may have been perfectly healthy when they came on board, and, after six days' journey, it was only wonderful to me that they all arrived alive. I will guarantee that if they had not been such old cattle they would not have come over alive.

601. (*Viscount Cranborne.*) Can you give the Commission any idea of the average number of deaths which take place on a journey of that kind ?—Perhaps the best guide that I can adopt is the insurance. We effect an insurance upon cattle which come from Schleswig and Holstein for one and a half per cent., which is very small, and the cattle are sent all through the season, including the summer and winter months ; the cattle are insured for the whole season, although in the autumn the risk is of course much greater, it would be then 3 or 4 per cent.

602. (*Dr. Playfair.*) You stated that the inspectors have been very careful since the outbreak of the plague. Are you aware that Dutch cattle have been imported with the plague upon them ?—I have heard of one animal in a cargo that was detected here, and consequently the whole cargo was detained and slaughtered.

603. Have you never heard that more were detained ?—No.

604. (*Chairman.*) I think you stated, that when these cattle came over, they were in an exceedingly lean state ; how was it that they happened to be purchased by butchers in that state ?—I will explain that ; they were slight of meat, as we call it, although they might be tolerably well fattened, yet from their age the meat had all disappeared on their backs ; when they get old they get slight of meat, and that is the case with most cattle.

605. (*Dr. Playfair.*) Does the fat remain ?—Yes, the internal fat.

606. (*Chairman.*) Did the whole lot consist of old cattle, with no young cattle among them ?—There were very few. I did not see above two or three young ones at all that were not above four years old.

607. They were not adapted for grazing ?—No.

608. (*Dr. Playfair.*) Do you agree with other persons in thinking that that herd of cattle brought the disease into the Cattle Market in London ?—I am quite certain in my own mind that they did not, from what I have seen of them, it may have been brought from other districts—from the south ; but it could not have been, according to my idea, brought in by that cargo.

609. Where from in the south might it have been brought ?—By the cattle that we get from Hungary and Podolia, and those parts.

610. To what ports do they come ?—They come either from Hamburg or by way of Rotterdam.

611. (*Viscount Cranborne.*) Do you know what line they take across Germany ?—They generally come by way of Magdeburg and Emmerich to Rotterdam, and some come by way of Halle.

612. Do they all come from Prussia ?—Yes ; they all come through Prussia ; I believe all of them.

613. (*Mr. Read.*) Can you state how long the cattle would be on their journey from Hungary to London ?—I should think, with stopping on the road, we might say about five or six days.

614. (*Dr. Playfair.*) Not more than that ?—I should think not ; they travel very rapidly now.

615. Have you heard that any of the steppe cattle, since attention has been called to the plague, have arrived with the disease upon them ?—No.

616. (*Chairman.*) During their passage through Prussia, would there be any inspection of the cattle trucks ?—I do not think there would ; on the Polish frontier there would be.

617. Supposing the disease to exist in Hungary, and that the cattle passed through Prussia on their way to a port, would there be any inspection of the trains as they passed the Prussian frontier ?—I think if there was any knowledge of the disease being in those parts, that the Prussian authorities would not allow them to enter at all, because I know they are very strict.

618. (*Dr. Quain.*) Have you formed any opinion as to the way in which the disease has been introduced into this country ?—It is impossible, I think, to say. I should say, myself, that it has come into the country just the same as any other disease ; pleuro-pneumonia, or any other disease.

619. (*Mr. Read.*) Do you believe that it was a spontaneous outburst in England ?—The first that I have seen of it has been amongst dairy cows, and I should not be at all surprised, from the unnatural way in which they have been kept in some of the dairies, that the disease may have originated there, because the way in which some of them have been kept has really been quite unnatural, and the very appearance of some of the animals, when they have been brought to our market, has almost denoted the disease.

620. (*Dr. Playfair.*) Do you mean to say that the dairies in London are badly kept, notwithstanding the inspections which take place ?—Yes ; some of them.

621. (*Mr. Read.*) A cow in an advanced stage of pleuro-pneumonia is a very common thing in the London market, is it not ?—We have seen very little of it this year, or of the foot and mouth disease. We have seen, comparatively, very little of it.

622. (*Chairman.*) Do you import many cattle now from Holland ?—Yes, every week.

623. From what ports do you import them ?—From Rotterdam, and from Harlingen.

624. (*Dr. Playfair.*) It is not an uncommon thing that Hungarian cattle come continually to the

London market ?—It is a difficult thing to say ; but these cattle come every week that we call Hungarian cattle. I allude now to the breed ; but of course we do not know ; we have to do with the dealers only ; and we do not know exactly from what districts they come.

625. (*Mr. Read.*) What colour are the Hungarian cattle ?—They are white.

626. Not black and white ?—No ; they are white cattle, with large horns.

627. (*Viscount Cranborne.*) You have known of no cattle called by the name of steppe cattle in the London market ?—No.

628. Have you never met with such cattle in the course of your business ?—Not at all.

629. (*Mr. Read.*) The steppe cattle have been described as of a mouse colour, with black under their bellies ; do you remember having seen any cattle answering that description ?—No.

630. You saw none of that sort in the cargo which has been spoken of ?—No.

631. Do you know that cattle which have been afflicted with the plague have been bought in the market, and sent off by railway to other districts ?—That I am not prepared to say. I should almost fancy that cows have been bought and sent to other districts. I know that cows are going every week to Leicester, and I should think there had been,—in fact, a man told me that so early as the beginning of June, or the latter end of May, he purchased some cows in the London market, and when he took them home to Leicester he did not know what was the matter with them ; they appeared somewhat to have the symptoms of the disease, which was afterwards discovered, and he had them killed as soon as possible. When they were killed the meat was shown to have inflammation in it, and the bodies were in an inflamed state, so that evidently it must have then been amongst the dairy cows.

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632. (*Chairman.*) What was the date of that occurrence ?—It was early in June, or at the latter end of May ; but I can get the date precisely.

633. (*Dr. Playfair.*) Will you be good enough to get the date and the name of the man ?—Yes ; the name of the man was Mr. John Scott of Leicester. I shall see him next market day, which will be on Thursday.

634. (*Chairman.*) Can you give the names of some gentlemen who are the largest importers of foreign cattle into this country, say of Hungarian cattle ?—Yes, the Berlin salesmen, as a class, export largely into this market, and there are persons in Magdeburg, and also a firm at Cologne.

635. To whom are the cattle consigned in London ?—They are consigned to various salesmen, particularly to Mr. Pool.

636. Where is he to be found ?—In the Metropolitan Market, or No. 17, West Smithfield.

637. He carries on one of the largest businesses in cattle from abroad ?—Yes.

638. It was stated yesterday that some of the cattle were sold at Hull to Mr. Lambert of Manchester. Was that the case ?—No ; the names that were given to me were those of Dickenson and Derby.

639. You gave us just now the name of Mr. Coulson ?—Yes ; they were sold by Mr. Coulson to Dickenson and Derby. Mr. Thomas Coulson is my agent at Hull.

640. (*Mr. Read.*) You stated that cows are sent down to Leicester ; are they sold there for the purpose of slaughtering ?—Yes.

641. (*Dr. Quain.*) To Mr. Scott ?—Yes ; he is in the habit of buying a great many in the London Market.

The witness withdrew.

Adjourned till to-morrow at 12 o'clock.

Wednesday, 11th October 1865.

PRESENT :

Earl Spencer.	Dr. Parkes.
Viscount Cranborne.	Mr. M'Clean.
Mr. Lowe.	Mr. Wormald.
Dr. Lyon Playfair.	Mr. Ceely.
Mr. Read.	Professor Spooner.
Dr. Quain.	

EARL SPENCER in the Chair.

Mr. Henry Priestman examined.

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642. (*Chairman.*) Have you been employed as an inspector of cattle in the city ?—I have.

643. Will you state by whom you were employed ?—Under the Order in Council of 24th July.

644. You were appointed by the Clerk of the Council ?—Yes.

645. Are you a veterinary surgeon ?—Yes. I am a member of the Veterinary College of London.

646. In what district are you an inspector ?—At the present time I inspect the whole of Islington, Clerkenwell, Holborn, Bloomsbury, St. Giles's, and St. Luke's. I had St. Pancras, but another inspector has been appointed for St. Pancras. And I also had Hornsey and Highgate, but another inspector has been appointed for those places.

647. Have you the sole charge of inspecting these districts ?—Yes, with the exception of inspectors appointed by the parish authorities appointed by the justices.

648. Will you state to the Commission the nature of your duties as inspector ?—As far as practicable to go from shed to shed and inspect the animals ; but the whole of my time is taken up in attending where I get information that the disease really exists. I get information either through the parish inspectors or through the police that cows have been removed from a certain shed, and I apply to the owner of that shed for permission to inspect the cattle, to see whether they are affected or not.

649. Has every parish an inspector under you ?—I am not aware that it has.

650. You have been doing this since when ?—Since the end of July.

651. Can you state the date of your appointment ?—My appointment is dated the 24th of July.

652. Had you any cases brought to your notice previous to the 24th of July ?—Yes, several.

653. Will you state the first cases which were brought under your notice ?—On or about the 27th of June I was in attendance at Mrs. Nichols', "Laycock's Dairy," and I discovered that we had certain animals labouring under disease. At first I was inclined to think that they were very acute cases of pleuro-pneumonia, but upon minute examination I

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was satisfied that it was not so. I had one or two of the animals killed, and made a post-mortem examination of them, and in less than four days we had several which died, I cannot say the number. In three days we had destroyed, I think, about 12 or 14. I examined them all, and I found the post-mortem appearances the same in every instance; of course the post-mortem examination which I made was made in the slaughter-house in the cattle market, or elsewhere; it was only a rough examination which I made. On the 28th of June I was called to a case at Hackney which precisely resembled the cases which I had at Islington. I was with that animal until 12 o'clock on the 28th, and I was in the shed again at 6 the following morning, and I found that the beast was dead. I made an examination of that case, and I found that after death, as I had before found, the post-mortem appearances were precisely the same as in Mrs. Nichols's case. On the 3d of July I had killed, or there had died, I think something like 20 cases, and I had 20 other cases in a quarantine shed on the premises. I applied to Professor Simonds at the college, and stated to him that I had a disease in one or two dairies which I could hardly understand, and in fact that I could not understand it at all, that it was something quite foreign to me. I described to him the symptoms and the post-mortem appearances. On the following morning I took him down the whole of the viscera of the cow which I had killed purposely. I took it as it came from the animal, and he inspected it; he then went with me to the dairy, and there saw 20 cows under treatment, 10 of which I had condemned on the morning prior to leaving as hopeless cases.

654. Were you in the habit of practising in that district before the outbreak?—Yes.

655. Were you constantly visiting many of these cow sheds?—My practice has been principally amongst cows for the last 14 years.

656. Had you visited Mrs. Nichols's shed recently before the outbreak?—Almost daily; the cows were under my control and under my professional care.

657. And do you believe that you saw the first case of this disorder which broke out in that dairy?—I think not, on the 27th of June. I think that one or two cases might have escaped our notice, and have passed as pleuro-pneumonia, the symptoms being so much alike.

658. Were you able to trace at all the origin of the disease?—No; the first observable cases which I took particular notice of were two cows which were bought in the market eight days prior. The 27th was on a Tuesday, and they were bought the Monday week previous.

659. What would that date be?—The 19th; this is Mrs. Nichols's case.

660. What were these cows which Mrs. Nichols purchased on the 19th?—They were two English cows.

661. Where did she buy them?—In the Metropolitan Market.

662. Did you see them when she first purchased them?—I saw them within a day or two; I cannot say whether the next day or the day after, but my attention was generally called to any fresh cows coming in, merely to look at them, and give a casual opinion of what I thought they were worth, and so on.

663. Were these cows in a healthy state when you first saw them?—They were apparently.

664. Where did these cows come from?—They were bought of Mr. John Lowe, but he had purchased them in the country; in what part I cannot tell you.

665. Who is Mr. John Lowe?—He is a cattle salesman living at Tottenham.

666. You have not endeavoured to trace them up any further than to the possession of Mr. John Lowe?—I have not; but I believe that they have been traced. I left that to Professor Simonds. He said that he would make that inquiry.

667. Will you state what you know of the possession of these cows; do you know from whom Mr. John Lowe got them?—I do not.

668. Did you hear at all from what part of the country they came?—No, I cannot say that I did.

669. You were not able to trace them up to contact with any animals which were diseased?—I did not make that inquiry about them, or I daresay that I could have found out. I could even now find what part of the country they came from, where they were purchased, and of whom.

670. Do you know from what district Mr. Lowe generally procured his stock?—From Leighton Buzzard, I know.

671. What did Mrs. Nichols do when she found that the outbreak was in her dairy?—I imagined at first that the animals were poisoned in some way. I inquired about the grass. I found that the grass had been fed off for the last seven or eight years, and had never been manured, with the exception of the manure from the cattle, and that it had been fed off by foreign beasts. I examined it and found that it consisted of clover, and what I considered good keep for them. It was cut and brought to the premises from the field. They were feeding when the disease first broke out twice daily upon this grass. I ordered it to be discontinued, and it was discontinued, and I thought that for a day or two we had fewer cases, and that we were going on better, and I felt rather inclined to think that it must have been from the grass, but after the lapse of two or three days it appeared to break out with increased virulence.

672. Are these cows kept on the borders of London, or are they in town?—They are in Islington. It is about two miles from the city of London.

673. Were the sheds where these cows were kept in proper order?—The shed was in very fine order; it was very lofty, and one shed would hold from 80 to 90 cows. The first animals attacked were outside, in open sheds, not in the large shed. They were covered to the beasts, but open behind them.

674. Besides the farm has not Mrs. Nichols some lairs?—The lairs adjoin the dairy where the cows were kept.

675. Were there many cattle housed there previously to the outbreak in the dairy?—A great number.

676. Had you observed any diseased animals among them?—I had not. I examined them for weeks after the outbreak almost daily. I walked through the lairs to see whether I could find anything similar to what we had in the shed.

677. (*Viscount Cranborne.*) What are your powers with respect to the slaughter of animals; may you order any animal which you think diseased to be slaughtered wherever you find it?—We may order it to be slaughtered if we are satisfied that it is diseased.

678. Whether you find it upon private property or in the market?—Of course upon private property. I have no control over the market.

679. In any place, no matter where, so long as you think an animal to be diseased, you may order it to be slaughtered?—Yes; I have the Consolidated Order in Council which I act upon.

680. Do you carry on a constant inspection, not only of the market but also of all private sheds within your district?—As well as I can.

681. How often does your time enable you to go to each shed, I mean a shed of which you have no particular knowledge that it is infected? Do you not go to sheds unless you know that they are infected?—Not to very many.

682. Then how do you find out when a shed is infected?—I get the information either through an inspector or through the police, or from what I glean in going to other places.

683. Do the police or the inspectors go into the sheds?—They do not.

684. Then how do the police get any knowledge

of the infection?—The police see cows taken away from a shed; latterly they have given me information.

685. Have the police done that of their own accord or under any order from head-quarters?—I am not aware.

686. Do the police make it a part of their duty to watch property to see whether cows are taken away?—They have not done so.

687. Should you say that there was a sufficient force of inspectors to be able to keep a constant supervision over all sheds, infected as well as uninfected?—No, not by a great many.

688. How much larger should you think that the force ought to be before any such supervision could be carried out, a supervision sufficient to detect infected cattle by actual inspection?—It would require one inspector to every parish.

689. How many parishes now go to an inspector?—I have six or seven, some inspectors have but one, there is one appointed for St. Pancras. I had St. Pancras with my others.

690. Have you any idea how many head of cattle are under your own care?—There are now very few, more than four-fifths have been destroyed, or have died.

691. Before the pest commenced how many do you think you had?—I can form no idea.

692. Not even an approximate idea?—No.

693. Do you know how many cattle owners you had under your jurisdiction?—No.

694. Had you any systematic and regular circuit, any order in which you visited the sheds; or did you only do so wherever you might accidentally hear of infection?—That is all.

695. So that you depended entirely upon information thus accidentally gained, either casually or from the police?—Yes; I was obliged to do so.

696. Your leisure was not sufficient to enable you to do more?—It was not. I could not possibly do it. I have employed my assistant to go round and get what information he could. He has visited from shed to shed, but the owners were rather lax in giving him information; many of the people would do so because I was well known to the cowkeepers as attending a large quantity of their stock.

697. You found that the cowkeepers were generally not anxious to inform you whether there was disease or not?—They would not until they had got rid of the principal part of their stock, and then they would give us the information freely.

698. How many cattle have you ordered to be killed since the first outbreak of the pest?—I cannot tell you the exact number; I have an account of them.

699. Will you send it in to the Commissioners?—Yes; I have had diseased cows killed or have allowed them to die. Sometimes, when the owners have disputed whether the animals were actually suffering from the disease or not, I have allowed them to keep them until they have died.

700. I wish to know how many you caused to be killed; you never have any killed but those which are diseased, do you?—No, except that I give an order for those to be slaughtered which do not show signs of the disease, if the owners think proper for them to be slaughtered.

701. Is the slaughter done at the public expense?—It is done at the man's own expense; he is not compelled to slaughter the animal. For instance, I had a case this morning of the disease, where a man has the disease among his stock at Finchley, and he has a good cow at home, at Holloway, at his shed. He came to me saying that he wanted to sell the cow, that a butcher wanted to buy her. I saw her; she showing no signs of the disease, I gave my certificate to the butcher to take her away and slaughter her; and he signed my certificate as having received her.

702. What advantage is that to the man?—She shows no sign of the disease although his stock are affected; it is to enable him to sell the animal.

703. Have you any proof that the cow is killed beyond the assurance of the owner that it is not sent away into a grazing district?—I have the receipt of the man; it is on the order.

704. Is that the owner or the butcher?—The butcher.

705. Then the butcher is paid for what he does by the man whom you forced to kill his cow?—I do not force him at all; it is the concern of the man; he wishes to make money of this cow before the disease affects her.

706. I am speaking also of the diseased cows; at whose expense are they slaughtered?—At the owner's expense.

707. Suppose that the owner does not kill them?—Then they die.

708. You cannot force the owner to kill them?—You can compel him to kill them, and he ought to bury them; but in London we cannot make the owners bury them, there is no room to bury them.

709. (*Dr. Playfair.*) You can compel them to kill the diseased cows?—Yes.

710. (*Viscount Cranborne.*) What would happen to a man if he did not kill his diseased cows?—I should prosecute him.

711. Have you ever prosecuted a man?—No, not at all.

712. Do you know what penalty he would be liable to?—A penalty not exceeding 20*l.*

713. How long have you been appointed?—Since the 24th of July.

714. Were you a veterinary surgeon previously to that?—Yes.

715. Is that the case with all the inspectors in the district?—I am not satisfied of that fact.

716. Have all the inspectors in your district equal power with yourself to order diseased animals to be killed?—I believe that they have.

717. Has your assistant that power?—No.

718. Were any testimonials required of you before your appointment?—No.

719. Were you required to show any degree or diploma?—No.

720. (*Dr. Parkes.*) You saw the first case on the 27th of June?—Yes.

721. The animal was then ill, and you recognized a serious disease?—Yes.

722. At what date do you suppose that that disease would have commenced in that animal?—Most likely the day before.

723. You are not certain?—I am not certain. We were in so much confusion then that particulars were not taken as they would have been. We had 40 animals all ill with a fresh disease, and there was confusion in every way and shape at that dairy at that time.

724. I think that you have stated in answer to the chairman that there may have been some previous cases?—There may have been.

725. Is it possible to learn whether or not there were any previous cases before the 27th of June?—It is impossible.

726. Is there nobody at all to whom we could apply for information?—Nobody.

727. What makes you think that there were previous cases, or might have been?—I think that there might have been, from reference to my book, and I also find that we had cases which were sent away as cases of pleuro-pneumonia, and I think that I might not have gone so minutely into the matter, and might have passed them over as cases of pleuro-pneumonia a day or two before the 27th of June.

728. In the same dairy?—Yes.

729. Not in any other dairy?—No; I do not know of any other dairy.

730. Are you quite certain that the first two cases which you saw at Mrs. Nichols's were bought on the 19th in the market?—It was so described to me.

731. Do you happen to know whether they were in the same part of the market as that at which the first case at Hackney was bought?—They were

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bought precisely on the same day as the Hackney cases.

732. And in the same part of the market?—Yes, because all English cows are sold in one part of the market; there is a part apportioned purposely for the sale of English cows.

733. I think you said that Mrs. Nichols's cows had been grazed on grass which had received the manure from foreign cattle?—It had been grazed by foreign cattle for the last seven or eight years, I believe.

734. Do you believe that it had been so grazed by foreign cattle immediately before this disease broke out?—I believe it had.

735. You do not know what foreign cattle?—No.

736. You are not aware whether any of the Revel cattle had been fed there?—No; I believe that it would be a mixture, but I had nothing to do with that as my duty was merely with the shed cows.

737. (*Mr. Read.*) If they were fed upon this cut clover, of course the clover must have been some weeks in growing since the cattle were depastured upon it?—It had been shut up but a month at most.

738. You have said that Mrs. Nichols's cows first suffered from the plague; is Mrs. Nichols's dairy the same as "Laycock's Dairy?"—Yes.

739. Is there a better built or better ventilated or managed dairy in the metropolis than Mrs. Nichols's dairy?—I think not; I always considered it one of the best sheds which I have gone into.

740. You have spoken of diseased stock, by that you mean simply those diseased with the plague?—Yes.

741. What has been your usual custom as regards pleuro-pneumonia; if you found a cow which was good beef did you attempt to doctor her?—Never; I sent her away.

742. You think that you might have mistaken an early case of the plague for pleuro-pneumonia, and have adopted the same course?—I feel satisfied that I might.

743. These were two fresh cows; is it your opinion that these cows contracted the disease in the market, or that it arose spontaneously in that dairy?—That I cannot say.

744. You have not formed an opinion upon that point?—I have not.

745. (*Mr. Ceely.*) Have you made many inspections of dead animals?—Yes.

746. Is there much uniformity in the appearances? Yes. I have not made so many inspections of dead animals lately, having been otherwise engaged, but at first I did so, and there was a general uniformity.

747. In the fourth stomach?—Yes, in the fourth stomach, and all through the mucous membrane; the first stomach was invariably full.

748. Was the vagina invariably affected?—Yes.

749. You found that in all the cases which you saw, from first to last?—Yes.

750. Differing in degree, I suppose, but not in essence?—Differing in degree, according to the length of time and suffering. Some of the animals were killed immediately that they showed the slightest symptoms.

751. Are Mrs. Nichols's lairs still used?—Yes.

752. Are there any diseased animals in those lairs?—I have not heard of any.

753. (*Dr. Playfair.*) Are they at some distance?—They are all attached; there is a wall between in parts, and there are gates between others. You can walk from one end to the other all over the premises, the lairs and the dairy premises as well.

754. (*Mr. Ceely.*) Is the disease still progressing in your district?—We get fresh cases, but not so many or so frequent because there is such a decrease of stock.

755. Do you think that there is as much mortality as there was in reference to the number of cases?—Yes, very nearly.

756. You do not think that the disease is milder? It lasts longer, but the result has been as bad.

757. Have you seen many animals recover?—Yes, a good many.

758. Has there been any ultimate death after apparent convalescence from the disease?—I had one case which was affected with plague which recovered, and then went off in three weeks afterwards of pleuro-pneumonia. It was an animal which had suffered from the foot and mouth disease previously to the plague.

759. In animals in which there has been no complication of pleuro-pneumonia have you ever seen a prolonged existence of the disease?—Yes.

760. Where an animal recovers of this specific disease do you think that it is a very useful animal?—In the majority of instances it is; in many cases where the animals have recovered they have been reported to me as cases improved in their milk, and as having given more milk than they did prior to being attacked.

761. Have you formed any conception at present as to the probable duration of the contagious properties in a convalescent animal, presuming them to be contagious. When an animal has recovered from the disease, how long do you suppose that it would be safe before you can mix it with others unaffected?—We have not tried that.

762. (*Mr. Wormald.*) How long has Mrs. Nichols's dairy existed?—A great number of years; I remember it myself over 20 years.

763. I recollect it over 50 years, and the owner of it, I think, was an old man; it belonged to Laycock?—Flight had it.

764. Laycock had it before Flight, had he not?—I do not recollect that.

765. It has existed over 50 years to my certain knowledge. Do you believe that when cattle have been kept in one situation for a great length of time they will be more prone to take disease than if they were in places which had not been used for such purposes?—Yes, I think they are.

766. Have these cows any opportunity of licking themselves when once they are tied up?—Yes.

767. Are they let loose?—No, not as a rule, but they have room to lick themselves, they can lick themselves if they are tied up.

768. What is the length of the band or machinery?—It is a chain which goes round the neck and works in a swivel, so that they can turn themselves both ways. They have room to turn themselves right and left; they are invariably tied in pairs.

769. If a cow is tied up by the neck I do not see how it can very conveniently lick its rump?—They do it.

770. Are these cows ever washed?—No, but they are curricombed and brushed.

771. They are kept very clean?—They are kept very clean there as a rule.

772. But they never have any moisture put upon them?—Not upon their bodies.

773. Do you think that it is a needful thing that cows should have some moisture applied to their skins?—I think that it would be a good plan.

774. If we observe nature we see that a cow devotes a great deal of time to her toilet?—Yes, she does.

775. She bathes frequently?—If there is water in the field, or near it, she will go into the water when the flies are troublesome, and so on.

776. And she throws water over herself with her tail and legs?—Yes.

777. These cows have no such opportunity?—They have no such opportunity whatever.

778. Have you ever seen one attacked a second time with this disease?—No.

779. (*Professor Spooner.*) You say that in the early outbreak of the plague you think you might have mistaken several cases for those of pleuro-pneumonia?—I say one or two. I have not several booked as

having been sent away, but one or two cases I might have mistaken for pleuro-pneumonia.

780. Do you consider from your subsequent observation of this disease that you are now quite confident in its early stages to detect the one disease from the other ?—Quite.

781. Will you explain to the Commission one or two leading symptoms which will enable you to come to that conclusion ?—The leading symptoms would be the injection of the congenitiva, and also of the vulva. There is also loss of appetite and of milk.

782. But that you find in pleuro-pneumonia ?—Yes, but not so sudden a loss. You do not get so large a decrease of milk in pleuro-pneumonia as you do in this disease.

783. You say that the leading symptoms of distinction between this disease and pleuro-pneumonia in its early stage are the injected state of the vulva and the congenitival membrane of the eye ?—Yes.

784. Are those the main points upon which you rest your judgment ?—There is auscultation.

785. So that in fact you are now satisfied that you can distinguish between the one disease and the other ?—I feel satisfied that I can.

786. In the early stage ?—In the early stage.

787. Do you frequently find a complication, that is to say, that the same animal is suffering from both diseases ?—I often do. I have found many cases of that sort.

788. Do you mean to say that a cow is suffering from pleuro-pneumonia in an acute form, and that while so suffering she may also be attacked with the plague ?—Yes.

789. Or do you mean to say that a cow may have recovered from pleuro-pneumonia, leaving a solidified portion of the lung, and is suffering from this disease? —It may be either way. The lung may be affected by pleuro-pneumonia as well as by the plague.

790. Do you not view them both as special diseases? —Yes.

791. Do you think that it is likely that those two special diseases will exist in an acute form in the same animal at the same time ?—I have every reason to believe that they have done so in one or two cases which I have seen.

792. Are you of opinion that there is any connexion whatever between this disease and what is called the foot and mouth disease ?—I have known them to exist together since this outbreak in the same animal, that is to say, the foot and mouth disease and the plague.

793. In that case has the plague usually preceded the foot and mouth disease, or vice versâ ?—Vice versâ in one case which I particularly remember, one animal belonging to Mrs. Nichols—it was in a field at Hornsey—the foot and mouth disease existed first.

794. Do you not know that in some cases after recovery from the acute symptoms of pleuro-pneumonia cows are subject to rheumatic attacks of their joints and muscles ?—I have seen it more particularly after the foot and mouth disease.

795. Have you found in your experience that the plague is more prevalent in those dairies which have been in a neglected state and badly ventilated, or have you found it equally in those which are well conducted as in those which are the reverse ?—I have found it more in well-ventilated places up to the present time.

796. And what you would deem to be well-conducted establishments ?—Yes ; I have found more cases in well-conducted and well-ventilated sheds than in ill-ventilated and ill-conducted ones.

797. Do you mean that in well-conducted establishments, to which you refer, there are a greater number of cows contained?—There would be a greater number in one place.

798. Has not your attention recently been called to an establishment in St. Giles's ?—It has.

799. In what state did you find it ?—That is a very lofty and well-ventilated shed which is surrounded with buildings ; there is a large skylight ; it would hold something like 40 cows, and I believe it to be the first case in St. Giles's. I have not been able to detect anything previous to it ?

800. You have told the Commission that you consider that many of the cases occurring now are much longer in their progress than they were formerly, although fatal ultimately ?—Yes.

801. The mortality you think is no greater now than it was in the first instance ?—I think that the mortality is not so great.

802. Have you any opinion to offer why such a change should have shown itself ?—I think that the change in the weather has had a beneficial effect.

803. Do you consider this an imported disease, or that it has been generated in this country ?—My opinion has always been that it has been generated in this country, that has been my opinion from the experience which I have had respecting it.

804. You have said that several cows have recovered ?—Several have recovered.

805. Have you had any opportunity of watching those animals for a period subsequently to their recovery ?—Not minutely.

806. Can you state as to the quantity of milk which they may have given, or how long they may have been in a convalescent state ?—They would lose their milk for days, or they would give a very small quantity, just half a pint, which they would give out on to the ground.

807. You have said that cows which you have known to recover have subsequently turned out very useful animals ?—Very useful animals ; I have several such cases.

808. You mean for milking purposes ?—Yes.

809. (*Dr. Playfair.*) You have said that you are satisfied that there may have been two or three other cases in the dairy to which you have referred a day or two before the 27th of June ?—Yes.

810. And that you sent them away from the place ? —Yes.

811. Have you any reason to suppose that those animals may have been bought in the Metropolitan Market at any time since the 1st of June ?—I have not.

812. They were part of Mrs. Nichols' old stock, they were not purchased since the 1st of June ?—Just so.

813. Does that influence your mind in supposing that two cows from the Metropolitan Market which were bought on the 19th of June had introduced the plague. If these animals were there before the cows which were bought upon the 19th of June, do you consider that the old animals would have shown the symptoms earlier than those which you suppose brought the plague from the Metropolitan Market ?—No ; I should have thought that the animals which came from the Metropolitan Market would show symptoms of the disease first. The new animals were tied up away from the shed, and separately ; it was always the rule to place the new animals away for a week or 10 days. That was my wish, for fear of the foot and mouth disease.

814. But you say that you think that the disease first broke out in old stock, and not in new stock ?—Yes, if my opinion is correct as regards one or two animals being sent away previously to the 27th of June, but that is merely an opinion.

815. (*Mr. Lowe.*) You say that the cows cannot be buried in London. What then is done with them ? —They are sent to the knackers.

816. The diseased cows ?—Yes.

817. Do you consider that a probable means of disseminating the disease ?—I am not able to satisfy myself what becomes of them after they go to the knackers, although, as cases arise, they put lime and so on upon the carcases.

818. Do you consider this disease contagious ?—Very.

819. Do you think that the system under which you are acting as an inspector is an efficient one?—No.

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820. In what respects is it inefficient?—That there are not sufficient inspectors.

821. Do you think your powers sufficient?—Yes, I think that the powers are sufficient.

822. Have you any suggestion to make as to any increase of power?—None whatever. I think that we have quite powers enough.

823. Is it not the case that the disease has very much spread from the Cattle Market?—Undoubtedly.

824. Have you any power to prevent beasts being taken from the Cattle Market all over the country?—They have inspectors of their own in the market. I have seized animals in the market slaughter-house, and handed them over to their inspector in the morning.

825. So long as animals can be sent from the market all over the country, do you consider it possible to put an end to the disease?—No. I think that they ought to be stopped from going from the market into the country.

826. (*Mr. Read.*) I asked you where you thought that the disease was generated, you say that you think that it is of spontaneous origin, may I again ask you where you think that it originated?—In London.

827. Where in London? Do you think that it was in the Metropolitan Market or in the dairy that the two cows which you have spoken of contracted the disease?—Most likely in the market.

828. (*Chairman.*) Did Mrs. Nichols send any of her cows into the market after you first discovered this disease?—Yes, a great many; she sent a great many into the market alive, in fact the first Monday there were between 200 and 300 cows diseased in the market that I saw. I was with Professor Simonds and spoke to him about it. The first Monday after the discovery at Mrs. Nichols' would be on the 10th of July, after I had reported.

829. They came from various dairies?—From various dairies.

The witness withdrew.

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SAMUEL GIBBINS, Esq., examined.*

830. (*Chairman.*) Will you state to the Commission your position?—I am the chairman of the Markets Committee, who have the control and management of the Metropolitan Cattle Market of the Corporation of the City of London. I hold the position of chairman from having been many years connected with the City, and being a member of the Common Council. I am a member of an old firm of merchants in the City of London, by trade, and have nothing whatever to do with cattle; but as chairman of the Markets Committee I of course have had experience with them from the time that I have been associated with the Corporation.

831. You are appointed by the Council of the City of London?—Yes, by the Common Council of the City; one of the gentlemen who are on the committee is selected as the chairman for the time being.

832. What is the committee over which you preside?—The committee have charge of the whole of the markets of London, whether the Metropolitan Cattle Market at Islington, or Billingsgate Market, or Leadenhall, or Newgate.

833. In fact all the markets?—All the markets of the Corporation of London. As respects the Metropolitan Cattle Market, we are governed by an Act of Parliament, which has been occasionally altered from time to time, but which gives absolute power over the cattle in the market, and jurisdiction in every respect over it. The market itself was built by the Corporation at an expense of something like 400,000*l*. It was formerly in Smithfield, and was removed from thence to where it is now.

834. Will you state how the committee is elected?—It is elected from the Corporation in the same manner, I apprehend, as some of the committees of the House of Commons are elected. At the commencement of the year one member is taken from each ward. The city of London is divided into 26 wards, and one member out of each ward is selected and put upon the committee.

835. Your jurisdiction extends over all the markets?—Yes.

836. Will you state what the cattle markets are over which you have jurisdiction?—The Metropolitan Cattle Market at Islington is the only cattle market; there are also Billingsgate Market for fish, Newgate Market for dead meat, and Leadenhall Market for meat and poultry.

837. Is there any market besides the Islington market where live beasts are sold?—Not in the metropolis.

838. Are your ordinary powers very extensive over the stock which come to your market?—Very extensive; we have absolute control over beasts which come into the market, as far as they are in the market. Our control of course goes to providing proper stalls, proper places for sale, and proper arrangements, so that the business shall be conducted at a certain time and disposed of in a certain way.

839. Have you the control of the sanitary conditions of the cattle which come to the market?—Entirely so.

840. What are your powers with regard to that matter?—They are absolute. We have the command and the complete supervision of the market in every respect, both as to the supply of water, and the supply of the means to clean the market. There are lairs where hay and water are supplied; but their use is optional.

841. Have you ordinarily inspection over the cattle?—Yes, we have an inspector specially appointed by the Corporation who is responsible to the committee, and he has power to appoint and has appointed four others under him, to help him in his work. On ordinary occasions one inspector is responsible, whose duty it is to inspect the cattle, but he always has assistants, if necessary, whether veterinary surgeons or otherwise, as he may think proper.

842. Does he report to you in the case of sick cattle coming from the market?—It is his duty to report it every market day, Mondays and Thursdays.

843. What power on ordinary occasions have you of disposing of any sick animals?—If an animal is there sick and diseased, we have the power to order it to be slaughtered; and if in a bad state, chloride of lime, creosote, or other means are applied, and then the body is sent to the knackers to be destroyed.

844. Are you speaking now of before the Rinderpest broke out?—Yes, of the ordinary powers. Ordinarily speaking, if a cow or sheep be found fit for food the beast is given up to the owner; if not fit for food the animal is slaughtered, and the skin given to the owner in the ordinary way; but since this disease has appeared we have destroyed it entirely.

845. Will you state to the Commission any facts which have come within your knowledge with regard to the outbreak of the cattle plague in the Metropolitan Market?—The facts have been so numerous in the last six weeks, that I am afraid they would take a very much longer time than you would like to give to them.

846. When did the outbreak of the disease first come to your notice?—The first that I heard of it was the 26th of July; it was the last meeting held in July.

847. You did not hear of the Cattle Plague before the end of July?—No. The committee ordered that

* *See* Appendix A., Returns furnished by Mr. Gibbins.

the inspector should use every possible means to ascertain where those diseased animals came from, that he should take care that the market was properly and thoroughly disinfected, and that all the hydrants should be put into proper repair, so that the whole market should be flooded every market day. It was quite the end of July before the attention of the committee was drawn to the subject from any report the committee received from the inspector there.

848. Did you increase the number of your inspectors?—Immediately; we immediately ordered an inspector to be placed at each gate, independently of the inspector who was responsible to the committee. We had an inspector at each gate to look at every animal which came in, and to report.

849. Do you consider that these measures have been efficient?—Yes; for on Monday week's market, out of 6,550 beasts, 35,650 sheep, 454 calves, and 310 pigs, only one beast was found in a diseased state and ordered to be slaughtered; whereas, in the beginning of August, on one or two occasions, there were scores sent out of the market in consequence of having symptoms of the Cattle Plague. On one day it was stated that there were nearly 200 there.

850. When was that?—At the beginning of August, when our attention was first drawn to the matter. On one day it was a question whether nearly 200 should be destroyed or not.

851. What happened with these 200 animals?—A great number of them were destroyed under the first Order in Council, and as to the others it was doubtful what should be done with them. There was a drove of some 120 to 150 animals. Our inspector was alarmed at the magnitude of them; and as they only showed the first symptoms of the disease, and were fit for human food, he thought that it was too great a matter for him to order them to be destroyed, and they were allowed to leave the market.

852. Since then have there not been other cases of a similar kind?—Not of that magnitude. We have had other cases since then; but I myself consulted with Professor Simonds on the subject, and we thought it best strictly to adhere to the Order in Council, and that when any more animals came in that state they should be destroyed, and some hundreds have been destroyed since, but at no one market were there as many as on that day.

853. Do you not believe that a good many animals which have been in the market since July have taken the disease to the country where they have gone?—I have no doubt of it. I have no doubt that innocently the Metropolitan Market has been the means of distributing the disease all over England.

854. How do you account for that?—On the first outbreak of the disease in London the cowkeepers were frightened. They found one cow after another dying, and understanding that the cows in the early stage were fit for food, and knowing that if they remained on the premises they would all die, or fearing so, they hurried them off to the market as fast as possible. It was not then sufficiently known to be detected, and they went from thence to other sheds and other places. I have not the slightest doubt in my own mind that that was the fact, and as soon as I was acquainted with it I took the opportunity of waiting upon Sir George Grey, and pointed out to him that we had no power to stop the beasts coming into the market; because up to that time, it being a public market, however diseased a beast might be, we could not stop it, either by the Act of Parliament, or by the Order in Council. Subsequently the Privy Council passed an Order in Council giving power to inspectors to inspect sheds, and to prevent animals coming from diseased sheds to the market, or to any other market.

855. Your inspectors were not able to detect the disease in the early stages of the outbreak. Animals with the disease in the early stages came into the market?—They were not able to detect it in the month of July. I think that now they are pretty well informed upon the subject, and that when they see a cow they know whether she is diseased or not.

856. What has been the effect of the suggestion which you made to Sir George Grey, which I believe has been carried out?—Referring to that Order in Council, directions were given that the name of the owner of beasts coming to the market should be taken down, the number of cows, and where they came from. We had other means of ascertaining where the disease was raging, and in whatever shed it was raging those cows were not permitted to come into the market. By strictly adhering to these orders we have been able to stop diseased cows from coming into the market, and have, I think, cleared the market of a great deal of its former mischief.

857. What measures do you now consider of importance?—A difficulty has arisen in consequence of the last Consolidated Order. It is stated in the 18th clause of the Order in Council of the 22d of September, that during the continuance of the Cattle Plague no animal shall be brought or sent to the Metropolitan Cattle Market, or any other market, except for the purpose of being slaughtered. Then it goes on to state, "and every such animal *as soon* "*as sold* shall be marked for slaughter in the manner "in which cattle are ordinarily marked for slaughter "in the Metropolitan Cattle Market." About 40,000 or 50,000 head of cattle, including sheep, are ordinarily sent to the market, and it was difficult to tell when the time of selling commenced and when it closed; the whole of the cattle and sheep were to be sold and cleared away by two or three o'clock in the afternoon, and we found a difficulty in ascertaining when they were sold. We could not mark them before they were sold, but as soon as they were sold we were to mark them, and we found a difficulty in that respect; a salesman the first time refused to have his cows marked for slaughter, saying, "They are not "sold, and I defy you to mark them." We waited upon Mr. Helps and had some conversation on the subject. We felt the difficulty because we could not tell when the animals were sold, and that we could not mark them unless they were sold. I suggested certain alterations, feeling there were great difficulties in that respect. One thing was that it was undesirable to alter the Order in Council which had been so carefully drawn up, and it was suggested that probably some means might be found of carrying out the Order in Council without altering it. Upon reflection orders were given to the principal clerk in the market to go round at a certain time in the day and ascertain from every salesman whether his beasts were sold or not, and as soon as they were sold they were marked. The principal salesmen co-operated with me and with the Government to have this carried out. Directions were given to him to take down the names of those who refused to have their cattle marked, and the number of cattle, so that, if necessary, a report might be sent to the Government; and it had a marked effect. When they found their names taken down, and that they were likely to run counter to the Order in Council, and to be brought before the Government, they began to give their names, and consented that the tails of the animals might be cut; and last Monday, I believe, very few left the market which were not so marked.

858. What proof have you that the animals which were sold were sold for the purposes of slaughter only?—There is a well-known custom in the market that when cows or beasts are marked for slaughter in the usual way they cannot be bought for any other purpose; no one would buy them for stock; it is well known now that the moment the tail is marked the beast must be slaughtered within a day or two.

859. With regard to those animals which are not sold, what happens to them?—They are taken into the lairs, with the consent of the owners. Since this Order appeared (with the consent of the owners), on Monday week, out of 6,550 beasts, 1,115 were turned into the lairs at the close of the market, 492 left

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the market, the owners refusing to mark them. Last Monday we had a very much better state of things.

860. What do you suppose became of the 492 animals which left the market without being marked?—150 were sent down to Plymouth to one of the Government contractors there, 94 were sent to Aldershot, and others in the same manner. It seems that those who contract to supply the dockyards with food have as a rule to submit the beasts for inspection before they are killed, and afterwards when the beasts have been slaughtered. These men, I presume, fancied that by the animals being marked in the tail for slaughter it would be known that they came from the Islington Cattle Market, and that it would prejudice them in the eyes of the inspectors at the dockyards. I told the inspector that the Orders must be obeyed, or that their names must be sent to the Government. Since then many have consented to have the animals' tails cut.

861. Has the working of this Order in Council been as beneficial as was expected?—Very much more beneficial than I thought a fortnight ago. I think that it is one of the best means which has been adopted to prevent the spreading of the disease; because now when it is known that animals are to be slaughtered that come into the market, or soon after it, few beasts come except for that purpose.

862. Has it diminished the number of cattle sent to the market?—No; the cattle lately have been very much increased. Formerly about one fourth part of the beasts which came to the market were foreign, and three fourths were English; but now, taking last Monday week as an instance, there were 6,550 beasts in the market, out of which there was the amazing number of 4,140 foreign; there are nearly two thirds foreign now instead of three fourths English.

863. Has it diminished the number of English cattle in the market?—Very much indeed. For the year 1862 I have the following particulars: I have separate returns for each week, but this is an aggregate return for the year. Out of 300,000 beasts which came through the Cattle Market, 50,000 only were foreign, and 250,000 were English. In 1863, out of 310,000 in round numbers, the foreign had risen to 80,000, and the English had decreased to 230,000. In 1864, out of 339,000, the foreign had increased to 119,000, and the English had decreased to 220,000. This year it will be still more startling. I am inclined to think the number of foreign beasts will reach something like 200,000, and that about two thirds of the whole amount of the year will be foreign cattle. In the last few weeks the foreign cattle have been very numerous.

864. Have you any means of comparing the number of English cattle sent to market before the last Order in Council, and since?—Yes, I have a return every week.

865. What has been the effect?—If it had not been for foreign beasts we should have had no means of supplying the London market with meat; but these foreign cattle have not come over in the fat state that our own cattle used to do from the North of England; but why meat is so dear I cannot make out.

866. Were the cattle dealers abroad who sent these cattle aware of this Order in Council?—No, not until last week. I have been in communication with several of them; and they are now acquainted with it, but they were not at that time.

867. Do you believe that it will have any effect in stopping the number of foreign cattle coming to the market?—I think not. My opinion is that our healthiest meat now comes from abroad. I have myself a very strong feeling upon the subject; and have heard that the Government contractors who go to the market, and who select cattle for the dockyards, mostly select the foreign meat as being the more healthy, and better for the service. The Jews as a body, who are very particular in their eating, as a rule take foreign cattle in preference to English.

868. From what part of the continent do these cattle generally come?—We get a great many from Germany, Austria, Hungary, Poland, and a great many from France. Some of our best beasts come from Spain and Portugal; in fact they come from all over the continent. Preparations are being made in Norway and Sweden to send over very large quantities.

869. Do they generally come to market in a healthy condition?—They come much more healthy than some of our English beasts do; the great outcry about the passage does not generally apply; there is no doubt that in some instances they have been very badly and cruelly treated, but those are exceptions to the general rule.

870. Is there a good system of inspection of these cattle when they leave foreign ports?—I am told that they are very rigid in their inspection on the continent; and I take it that the Government inspectors in England are very particular, certainly since the disease has become known.

871. The Custom House officers have been so?—I think so. I believe that they have been very successfully so. I know that the beasts which have come up to the market have been so singularly healthy that it is very rarely indeed that we have had occasion to seize or condemn a foreign beast. The greatest bulk of those which have been condemned have been cows, especially cows in the early stage of the disease, and latterly there have been some beasts also, but most of them have been English beasts.

872. What opinion have you formed as to the contagious or not contagious character of this disease?—I believe that it is a very contagious disease; when once a horned animal has been affected by it, and gets along with others, I have no doubt that it is very contagious.

873. Have you formed any opinion as to the origin of the disease?—Yes; my opinion is very strongly that it originated in our own London cow sheds, particularly the cow sheds connected with the metropolis of London.

874. Will you state generally your reasons for that opinion?—As respects the cargo from Revel it is well understood here I suppose how that cargo came. All I know of it is that about 170 beasts of that cargo landed at Hull, came to the London market, and were sold there on the 1st June in a healthy condition. Out of the 170 some went to Gosport; they passed our market; they were inspected at Gosport and found right; they were afterwards inspected when killed, and passed as food, and I believe were placed away as food. The others went, some towards the West of England and some elsewhere, but we have never heard a single syllable about them whether they were diseased or not; none of those cattle were stopped or found diseased anywhere. But something like a fortnight or more after those beasts were in the lairs of the railway company near the Cattle Market some cows manifested signs of the disease; many scores of cattle had been in the lairs between the time of the Russian beasts being there and the time of these cows being affected with the disease.

875. You say a fortnight after these animals were in these lairs. They were sold on the 1st of June, were they not?—I have not the details with me. I can supply the dates. At about the same time cattle were found diseased, and people were losing their cattle in every part of London. In Peckham Rye, Lower Norwood, and Islington, especially at Islington, in the western districts, and in the eastern districts, every morning came a report that so-and-so had lost his cattle, and so-and-so had lost his cattle. All this took place so simultaneously that I cannot at all understand how the disease can have been spread over the dairies, supposing that this cargo had brought the disease. About that time the letters which I had from every cowkeeper in different places were quite distressing. They stated that the disease was breaking out, and that some had lost

28 animals out of 30, and that some had lost three or four out of eight or ten, and in one case a poor fellow lost 100 out of 107, and so on. We thought that it could not have been brought from abroad, but that it originated from the state in which cows were confined and were existing in our London dairies; and when I tell you that in some of the London dairies cows were found which had never been out of the shed for two and three years, having been chained up to the mangers until the time when they came out, you will be able to judge for yourselves. In one shed in Warwick Lane, Newgate Street, there were 28 cows, and at one time when I was speaking on the subject I stated that at that time no disease had been found in any of the sheds in the city proper. I think that we have 29 sheds in the city of London. But the next morning a report came that in this very shed the disease had broken out, and since then the whole of the animals had been killed. I am very strongly of opinion that it will be most desirable for the health of the cattle, and for the question generally, that no cowsheds should be allowed in London at all. The herding together of large quantities of cattle in London and in the immediate neighbourhood is very injurious, both to the question of milk and to the health of the cows, and I think also to the parties themselves; and many of our larger dairy-keepers, I am told, have made arrangements to have their dairies further from London.

876. (*Mr. Lowe.*) You say that one beast in the market was ill on Monday?—On Monday the report was, one beast and one sheep.

877. What was the beast ill of?—Of this disease.

878. The Rinderpest?—Of what is supposed to be the Rinderpest.

879. This contagious disorder?—Yes.

880. You say that you prevent the beasts coming from the sheds; how do you prevent them?—We did not prevent them, but the Order in Council did. The suggestion of the Markets Committee was promulgated, and a penalty is now attached to those who are sending them from the sheds.

881. Do you think that that works?—I think that it has worked to a great extent.

882. Have you a perfect system of inspection so as to visit every shed?—We have no power of going beyond our own market, but we have a perfect power over beasts coming into the market.

883. But not in the sheds?—No; we have no power beyond the market itself. The Government inspectors of course will take the matter in hand now.

884. You say that these beasts go away to be slaughtered. Have you any security except the cutting of the hair that they are slaughtered?—None whatever.

885. Is it certain that they are all slaughtered in London?—No, but they are slaughtered immediately, and I have no doubt that many of them are sent not only to the butchers round about London, and to different places, but to Gosport, Portsmouth, or Plymouth. Last Monday week 22 beasts were sent to Highgate, 11 to Middlesex (the drover refusing to say where—his number was 459), three cows to Hampstead, 17 beasts to the York Road, 7 to Frome, 22 to Hampstead, 23 to Finchley, 29 to Hampstead, 10 the man refused to say where they went to, 15 the man refused to say where they went to, 150 went to Plymouth, 94 to Aldershot, 75 to Rochester, and 14 to another person as to whom we did not know where he lived. That was on the 2d of October.

886. Have you any security as to the time at which a beast is slaughtered?—We have no possible means of doing so, for as soon as they leave the market our power is gone.

887. Practically would they be all slaughtered in a day or two?—I believe so; they would not be kept very long.

888. You have taken precautions, as well as you can, as to not admitting beasts which are diseased into the market?—We have.

889. Can you suggest any precaution which might be taken to prevent the market becoming the means of spreading the disease, supposing that it still finds its way into it?—I think that the slaughter of the animals has had such an effect upon the question, and believing that the disease is more found amongst cows than any other beasts, in my opinion there is now practically no difficulty, for if they are slaughtered within a day or two I think that no great harm is done. Latterly the market has been singularly free from the disease, and certainly the disease is decreasing in and around London.

890. Then you would not be prepared to suggest any means for greater security that the beasts should not be sent down into the country in the manner which you have described?—I am afraid that, looking at the magnitude of the number, it would be impracticable to slaughter them upon the spot. At the slaughter-houses there are something like 1,200 to 1,400 slaughtered every week. Perhaps in the slaughter-houses they might manage to slaughter more, but not all that are sold in the market.

891. It occurs to one naturally that it would be so much better if these cattle were slaughtered somewhere in London, and the meat sent down to the country. You think that that could not be done?—I think that practically it is working itself round to that thing. We now find an immense quantity of meat coming to London from slaughter-houses in the country, from Leeds and other places, where there are very large slaughter-houses. We find that that is done now in preference to driving beasts, but in foreign places of course it would be impracticable.

892. You cannot suggest any regulation by which the slaughtering upon the spot could be secured?—I have not directed my attention to that point, and I should like to do so before answering the question.

893. You say that more cows were slaughtered than oxen at first?—Yes.

894. I suppose that that is one of the grounds upon which you infer that the disease is bred in London, and not abroad?—Yes.

895. You say that at one time 200 beasts were diseased in the market; can you state the proportion of those which were foreign and the proportion which were English cattle?—I believe that most of them were Irish cattle. They came from Ireland, and partly from Norfolk.

896. They had this Rinderpest?—I was told that some 20 or 30 gave unmistakeable signs of having this disease, now called the Rinderpest. Of 120 or 150 (I forget the number now) a great proportion showed symptoms of the disease, but our men were not sufficiently satisfied of it to direct them to be all slaughtered.

897. Could you get us information as to the numbers from different countries which had the disease?—I could refer back to my report, and get it.

898. But I understand you to say that the people were not sufficiently skilled at that time to distinguish the disease?—I do not think that now half the inspectors know what the disease is. At that time certainly many of them did not know anything at all about it.

899. Then we cannot get any accurate information about it; the disease might have been taken for pleuro-pneumonia?—No doubt many of the animals were in the first instance affected with the disease, and many of them were passed because the inspectors thought that it was pleuro-pneumonia, and that was where the difficulty of the inspector was.

900. (*Dr. Playfair.*) Have you any return of the nations from which foreign cattle are imported?—We have at the market an account of pretty nearly every port or country from which foreign cattle arrive in London.

901. Could you furnish us with a return from the 1st of June to the end of July of the different places

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from which cattle came from abroad ?—I can furnish you with it, but not at this moment.

902. Are you aware that the disease is prevailing in Hungary ?—No, I have no official notice of it.

903. Then you are perhaps not aware whether the Hungarian cattle imported have shown symptoms of the disease ?—I may say generally not. I have seen a great many of them myself, and I have had my attention particularly directed to them, and have asked the question over and over again, but up to the present moment I am not aware of the cattle from Hungary having the disease, and certainly not of any coming to England which have been stopped. Those cattle are peculiar cattle. You may by a little imagination fancy that they are some of the Bramah bull species. The Hungarian beast you may fancy with a very little alteration would make a Bramah bull.

904. How do you treat the manure of the cattle market before you sell it, or send it off from the market ?—In the very early stage of this question it impressed itself upon my mind as of so much importance that directions were given that all the manure, &c., and all things connected with it, should be kept entirely separated, and not allowed to go away from the market, but be destroyed by means of disinfectants. There is a very large space of ground there ; it has been put in a place by itself, and disinfected by chloride of lime and other disinfectants ; it has not been mixed with the other manure, nor been taken away, but is there at this moment. So much were we impressed with the importance, not only of the manure but of the blood of the animals which were diseased, that we appointed a slaughter-house expressly to be used for nothing else than to slaughter the beasts seized in our market, and the blood was not allowed to be sent away, but it was destroyed, with all the offal and everything else connected with it.

905. In the cleansing of the cattle market do you use disinfectants ?—We use chloride of lime to an enormous extent ; we first of all flood the market from end to end ; we have between 30 and 40 men employed in the market every market day, twice a week, first, to disinfect the market, and then to pour chloride of lime diluted with water about the market, over the stones, the rails, the halters, the lairs, and every part of the market, without any reservation whatever.

906. (*Mr. Wormald.*) You say that the market is flooded ; what becomes of the water with which it is flooded ?—It goes into the main sewer.

907. And where does it run ?—It runs, I believe, down to Barking Creek ; the Northern Outfall Sewer now goes down to Barking Creek.

908. (*Mr. Read.*) You said that you did not hear of the outbreak of the plague in the Metropolitan Market until the 26th or 28th of July. Are you aware that on the 10th of July no fewer than 200 diseased cows were exhibited in the market; have you heard of that fact since ?—I have not. I do not know how it could be ascertained. I can by reference to our books tell you the exact date ; but the period when the outbreak of the disease was brought to my notice was at the last committee meeting which we had in July.

909. When you say that this large drove of 150 or 200 diseased cattle would have to be destroyed, do you mean that they were utterly unfit for human food ?—No. I have taken down a memorandum, so as to furnish you with the particulars of it ; but I stated that the report made to me was, that on a certain Monday something like from 150 to 200 cattle were said to be infected, that something like 20 or 30 (my memory does not quite serve me) were absolutely diseased, seized, and destroyed ; but that a great number, a drove of 120 or so, were thought to be affected by the disease, but in so slight a degree that our inspector did not order them to be slaughtered, and they were allowed to go from the market. I will give the Commissioners the exact particulars of it.

910. How many of the cattle which are sold in the Metropolitan Market do you suppose are sent out to be slaughtered in the provinces ; about 500 on each market day, or a much larger number ?—That is a difficult question to answer. If I take the date of last Monday week, something like 500 were sent away to the provinces ; but this would not give the amount, because many permitted the tails to be cut of animals which were to be sent to the provinces, and therefore I cannot answer that question without going more particularly into it. I believe that, practically, a very great majority of the cattle coming to the London market are killed for the London supply. With regard to sheep, that prevails to a very great extent, and I believe almost entirely.

911. You say that the cattle are marked for slaughter ; how are they marked ? Is it in the ordinary way of cutting the hair off the tails ?—I was asked by Sir George Grey the question on Saturday. I informed him that the mode of marking beasts generally pursued in the Metropolitan Market when sold to butchers is by clipping the hair off the end of the tail ; that when sold to dealers and others the hair is left on, and such are then marked by a private clip, or by a piece of the hair being tied round the tail; but now that is not allowed to be done. Then, as to sheep, they are marked with red ochre on the back or head. Calves are marked by scissor clips on the back or sides. Pigs are marked with red ochre or with scissor clips. But the beasts are always marked for slaughter by having the hair cut off from the end of the tail.

912. As they always have been done ?—Yes ; and no butcher will buy them in that way unless he intends them for slaughter. He cannot sell them again.

913. Do you think that the supply of dead meat to London from the provinces increases ?—Yes, very much indeed. I have not the return before me, but it increases very much. Means are now being taken, and have been taken for some time past, to slaughter the beasts in the provinces and send them to London, so that we are now engaged in providing a dead meat market in the old Smithfield, and we are making a very large provision for the sale of meat.

914. Would you think that that in a measure would account for the diminished supply of live stock from the provinces ?—No, not really so, because up to the time of the outbreak the supply from English places was very large, and the supply of dead meat was large also. I can give you that return.

915. You say that one diseased sheep was seized ; was it affected with the plague ?—It was supposed to be so ; the sheep was sent to the college over which Professor Simonds presides, and a report can be given you ; our inspector is here, and he can give you the report. He told me yesterday morning that it was sent for a post-mortem examination ; it was supposed that it was diseased.

916. Have you had many seizures of diseased sheep ?—None before that I remember.

917. You stated that the dockyard contractors frequently, and almost generally, selected the foreign stock to supply the dockyards ?—For some considerable time past they have, for reasons best known to them, chosen to select (so I have been told) the foreign beasts as being more healthy than generally the English beasts have been.

918. Do you not think that that is from their comparative cheapness, rather than from their better health ?—I cannot answer that question. I know that the Government inspection is very rigid, and that they will have nothing but the best meat ; they are very particular in what they take, and we are now getting some splendid beasts from abroad ; they get them from abroad equal sometimes to our best fed beasts.

919. But still a very great majority of the cattle coming from abroad are cheaper than English ?—Yes,

far cheaper; but latterly they have been very much improved, and some of the Spanish beasts in particular have come up in a wonderfully fat state.

920. You attribute the outbreak to the London dairies in a measure, and you say that, in consequence of the general spread of the disease in a few weeks through the London dairies, you think that it must have been spontaneous. Do you think that it is possible that it first appeared in the Metropolitan Market, and that by the large purchases which are made every week in these dairies it might by that means have been conveyed simultaneously to different dairies?—Of course it is open to that view of it; but singularly enough for many weeks nothing was heard of but of females or cows affected by the disease, and those were in dairies which had not been near the market, nor had had cattle brought to them. That is the difficulty.

921. But the mere fact of cows in the vicinity of the metropolis being affected is surely just from this, that cows are constantly kept, and that bullocks are held only a day or two to be slaughtered?—Yes; bullocks are very rarely kept in the London dairies.

922. They are not kept in London except simply for the purpose of slaughter?—Certainly.

923. Therefore, as far as regards the metropolis, you would have nothing but cows which would continue for any length of time?—No; but I cannot understand how these cows in the various sheds should simultaneously manifest the disease when those cows had had nothing whatever to do with the market in any way whatever.

924. But at the same time why cows are affected in the metropolis would be that the bullocks or the oxen which are in the metropolis have not had time to manifest the disease, as they had been killed?—Probably so. I will admit that it is probably open to that view of it.

925. (*Viscount Cranborne.*) I understood you to say that you estimated the number of animals sent to the provinces to be slaughtered at about 500?—I guarded myself. The return last Monday week gave me 500 unmarked in the tail, but many left marked.

926. Would there be any serious difficulty in erecting slaughter-houses sufficiently large for the slaughter of those animals?—No; we have provision and every accommodation there for that purpose.

927. You could, without any great difficulty, slaughter all that required to be slaughtered; all in fact coming into the London market?—There would be only the time required to erect the slaughter-houses.

928. Is there ground where those slaughter-houses could be erected?—Yes; we have ground which might be set apart upon the system of the abattoirs in Paris, so that all animals should be slaughtered there. That was one of the intentions of the city authorities some time back; but it is a difficult question. We could not ourselves undertake to slaughter; all we could do would be to provide slaughter-houses and conveniences to slaughter.

929. If it should be thought right to permit no cattle to be taken away from the market, and to provide that all brought there should be slaughtered, there would be no difficulty in finding room for that purpose?—None whatever. There is no doubt abundance of room within the precincts of the market for anything of that kind.

930. If such a prohibition were issued, do you think that the supply of London food would be seriously interfered with?—I think not, for this reason, that it might cause a greater quantity to be slaughtered in the provinces and sent up by rail, which is now being done, and is found to answer very well. If you order that all cattle shall be slaughtered, you then will in effect be slaughtering principally foreign beasts which come there; but the provinces will still send up their meat as they do now in very good condition, so that I do not think that there would be any difficulty there.

931. It would not have any tendency to alter the general level of prices in the market?—I think not. Of course it is a large question, and a question involving very general considerations, but I do not see that it would have that effect.

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932. Has the last Order in Council had any effect in checking the importation of cattle?—None whatever; we have had more beasts come in during the last few weeks than in any corresponding weeks for many months past.

933. Do you anticipate that as soon as it is known in distant countries it will tend to check the importation?—I have asked the question of several foreign importers whom I know, and they say that they are so satisfied that their beasts are healthy and well that it will make no difference whatever.

934. Are the inspectors whom you employ persons who have had an education in veterinary science?—The inspector whom we have appointed in the market has obtained his degree under Professor Simonds, and is thoroughly qualified as a veterinary surgeon.

935. And can the same be said of his assistants?—Yes, of two of them; of the other two I am not quite so certain, but they are all four very qualified men; two of them are veterinary surgeons.

936. Do your inspectors profess to be able to know, not only whether a cow is diseased, but whether she is in a condition to convey infection?—I should like the inspector to answer that question himself; our inspector says that he should be able to do so, but that is a question which I can hardly be supposed to answer so well as the inspector.

937. Can you state the number of animals which have been destroyed under the order of your inspectors?—I can do so, but not so well as the inspector; and I can send you that return.

938. (*Mr. Read.*) Have you any idea how many of the cattle which are slaughtered in London are slaughtered at the Metropolitan Market?—I think I have answered the question. A few months ago, before this outbreak took place, it was necessary to make some arrangements for the inspection of the slaughter-houses, and I made it my business to inquire generally as to the number of animals slaughtered, and I then found that it was something like 1,200 to 1,400 per week. Since that time more have been slaughtered; we can give you the account, although the slaughter-houses are not absolutely under our jurisdiction, being let to persons who slaughter for anyone.

939. Do you not think that you could kill the surplus now without having any fresh slaughter-houses erected?—No; we could not kill 8,000 a week.

940. I mean the surplus which are sent out to the provinces, which would probably not be more than 1,000?—I should like to make inquiries before I answer the question.

941. Will you consider the question?—I will.

942. (*Chairman.*) Is there any other observation which you wish to make?—There is an observation or two that I should wish to make upon a point that has recently been before us, that is, the subject of sanitaria. We entertain a very strong opinion in the city of London, and when I say "we," I may mention that I represent the Metropolitan Cattle Plague Committee. I represent, besides, the Markets Committee; and I represent also the different portions of the metropolis. This committee is formed of gentlemen and medical officers of health of each of the metropolitan districts, and members of the district boards of the metropolis, and very strong opinions have been entertained by them latterly that means should be adopted, and which might still be adopted, with a view to the cure of this disease. We feel that while the Order in Council permits cows or animals to be moved from any shed to a slaughter-house to be killed, the same means might have been adopted to have removed them from the cattle sheds to places where they might have been treated; and had we had permission before, I have no

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doubt that long before this we could have reported a successful result; as it is, we have not been permitted to do it, except in a manner which precluded us from doing as we desired, and this so trammelled us that we have determined to dissolve the committee and throw the onus upon the Government, or, I should say, upon this Commission. It is a subject that has received very grave consideration by us as to what we think might be done and ought to be done.

943. (*Dr. Quain.*) Would you not feel afraid of the risk that would be incurred in transferring these animals from place to place in the way you have suggested?—We do not think there would be any risk; we think that the cattle might be conveyed in ambulances or carts or vehicles provided for that purpose, taking of course great care that they should not have any means of communication with any other cattle. We think that there would be much less danger than is incurred now in moving cattle from the sheds to be killed at the slaughter-house at Islington; and I sincerely hope that before this Commission closes its inquiry it will be able to point out some means whereby this suggestion may be not only entertained but carried to a successful issue. We think that it is deserving of the gravest consideration, and any information which I or the city authorities can furnish to the Commission will be most cheerfully and gladly given.

The witness withdrew.

J. Simon, Esq.

JOHN SIMON, Esq., (Medical Officer of the Privy Council, F.R.S., and Surgeon of St. Thomas's Hospital,) examined.

944. (*Mr. Lowe.*) You are the medical officer of the Privy Council?—Yes.

945. Are you prepared to give this Commission any information as to the subject of their inquiry?—I am afraid I must represent myself as one of the laity in respect to steppe-murrain. I cannot pretend to any special knowledge of cattle diseases. The interest I have taken in the present disease has of course been very great, both because of its pathological importance, and because of its importance to the country. But the kind of experience of the disease which skilled veterinarians ought to have I cannot pretend to possess.

946. What means have you taken to inform yourself upon this subject; it is not the first time, I believe, that it has come before you?—I have read much about it, and about a couple of years ago I had occasion, as medical officer of the Privy Council, to look generally into the question of cattle diseases. During the present epidemic I have seen some of the sick beasts.

947. In the recent outbreak?—Yes. I have also attended some of the post-mortem examinations, and have done what I could, as a looker on, to inform myself on the subject.

948. What do you consider to be the nature of the present disease among cattle?—In medical language one would call it a fever.

949. Is it identical with any type of disease with which you are acquainted?—It is clearly, I believe, the steppe-murrain.

950. Do you entertain no doubt upon that?—If, speaking hypercritically, I might perhaps express a shade of qualification as to minute differences, and say that there may be, from differences in the breed of the cattle, and from differences in the climate, and so forth, little differences in our English manifestation of the disease; but I have no doubt, substantially, that the disease is steppe-murrain.

951. Have you formed any opinion as to the origin of the disease in this country?—Proof on the point is now, I think, impossible. But though I cannot prove that the disease was imported, I think there can be no reasonable doubt upon the subject.

952. You do not believe that it is indigenous?—No.

953. Will you state to the Commission why you believe that it has been imported, and that it is not indigenous?—It had been out of the country for 120 years, and I understand that the outbreak here followed after this long interval the first direct communication in the way of cattle traffic with Russia, where the disease is always present.

954. Have you any view as to the manner in which the disease has become diffused over the country?—I suppose that among that much-discussed cargo from Revel, and in that section of it which afterwards travelled from Hull to London, there must have been a beast or beasts in the incubatory stage, or with mere premonitory symptoms of the disease, or with the disease in a very mild form,—that, in a word, the Revel cargo was diseased, though not in a degree to attract notice. I suppose that infection was thus brought into the London Cattle Market, and it must have spread from there of course with immense rapidity. Apparently it first got into the London dairies, and the animals, as they fell ill, were sent to the market, and each animal so sent to the market no doubt infected swarms of others. Before the disease had made anything like its present progress in the country, two well-known medical gentlemen, members of my profession, and one of them employed by our office, visited the Metropolitan Cattle Market to see what was going on, and they counted on that occasion 20 animals in the different stages of the disease, any one of which animals could have infected numberless others.

955. Will you give the names of those gentlemen?—One was Dr. William Budd of Bristol, and the other Dr. Thudichum.

956. That discovery alone would appear to be sufficient to account for it?—It would be sufficient to account for any amount of steppe-murrain you like. To have seen one animal there would account for an unlimited diffusion of the disease, but they saw 20 in one day. I mention this merely as an illustration of the enormous facilities which must have existed for spreading the disease, when so many as twenty well-springs of contagion could be counted in a single market.

957. I gather from your evidence that you think the disease is exceedingly contagious?—Yes.

958. Do you think it can be communicated in any other manner than by contagion?—Do you mean by direct contact?

959. I mean what you understand by contagion, contact with a diseased animal, not actual touching, but coming within its influence, or within reach of its exhalations; is it epidemic?—With similar human diseases I do not know "epidemic" apart from "contagious." I believe steppe-murrain to be in the highest degree contagious, and in the sense of being communicable from sick animals in various direct and indirect ways.

960. Have you formed any opinion as to the possibility of curing the disease?—Those who have had the largest experiences of it, the Germans, particularly the Austrians and Prussians—and they are very accomplished veterinarians, I believe I may say the most accomplished in Europe,—they and the Russians have always failed in curing the disease; they have had no success against it whatever. It seems probable, I think, that they find themselves in the same position as we do in relation to the small-pox or scarlet fever, or typhus fever, or typhoid fever of the human subject. For these diseases we have, properly speaking, no *cure*. Our treatment is purely expectant, dietetic, and palliative. They may be bungled by bad treatment and be made worse, no doubt. But their nature is to run a certain course, which we have no means,

at present, of arresting; and each of them, notwithstanding the most skilful and discreet management, will be attended with a certain fatality. The veterinarians are in a similar plight with regard to steppe-murrain. They have no means of cutting it short. It runs its typical course in the diseased animal. Do what they will, the disease will have a very large fatality—so large a fatality, that the common opinion of the veterinarians of Germany and also of France, but especially those of Germany, seems to be that it is not worth while ever to treat it, and that it is better economy to kill the beasts.

961. Do you incline rather to that opinion?—As regards national policy, certainly.

962. Have you considered the question of inoculation with a view to cure?—The continental experience, I believe, has uniformly been that there is no use in inoculation. And the common objection must be remembered (which has been held to be valid against human inoculation of small-pox), that practitioners would diffuse the disease enormously by resorting to inoculation.

963. You are aware, no doubt, of the present measures which have been taken for the suppression of the disease by the Privy Council?—Generally I am.

964. Do you think that if matters are left to go on as they are going on, we shall see the end of this disease soon?—Certainly not.

965. What do you anticipate will happen?—We have not got materials making a positive prognosis. It is not a matter in which one can speak dogmatically of the future, but when the disease was here before it prevailed for 10 or 12 years. I cannot expect that it will die out; I do not know why it should. Smallpox came to us once as this disease has now come to our cattle, and it has not died out; and the same may be said of various other diseases which have not died out, and I should not expect that it would in this case.

966. Do you consider the circumstances of the country, from being more thickly populated and more fully stocked than it was a hundred years ago, more unfavourable to getting rid of the disease?—I consider the circumstances of the country, in the far greater facilities which exist for communication from one part of the country to another, to be far more favourable than the circumstances of the country a century ago for the continuance of the disease.

967. You look upon it as a very serious matter?—I look upon it as most serious.

968. Have you turned your attention to any remedy that might be devised?—I can only pretend to speak from a medical point of view, and there may be overwhelming objections on the part of the patient to the particular remedy that is to be recommended. In many cases of human disease, where eventually amputation must be resorted to, the patient would not at first imagine the necessity for such an operation, and would vehemently refuse his consent to it at those early stages where yet his surgeon can plainly see what must come. And the surgeon hesitates to speak till the patient feels the real pressure of the disease. So it is here. I think I can see very clearly that no moderate and popular means will stop this disease.

969. Can you tell this Commission, supposing we could do just as we liked, what measures ought to be taken with a view to getting rid of this disease?—First, absolutely to stop the movement of cattle.

970. Anything else?—For a limited time absolutely to stop the movement of cattle, of course including importation. After the lapse of a fortnight there would be no new cases of the disease, except in places where the infection already was, and there the police of the country must see it out, and see that the places be properly disinfected.

971. What do you mean by "see it out;" do you mean that they should kill the cattle, or let them die?—Probably at first it would be almost a matter of indifference to the public which of those two courses was taken. But certainly after some time, when the disease was getting comparatively rare, there might be great advantage—that is, great economy of time, in killing off simultaneously all the infected stocks.

972. How long would you suspend all movement of cattle?—I should think that three or four months would be sufficient, if the principle were universally and rigidly acted on. Otherwise the process might be protracted indefinitely.

973. For instance, would you not allow a cow to be sent to a bull in order to propagate the breed?—Speaking generally, no. It might be necessary, in working the plan in a district, to give to the authorities who superintended it the power of making limited small exceptions in certain cases, under strict guarantees against abuse and against mischief; but speaking broadly there must be, if such a plan is to attain its object, an absolute stoppage of the traffic in live cattle. Of course I do not pretend to judge how far the police arrangements of this country would permit that to be thoroughly well done, nor do I pretend to judge what the cost of it would be. Doubtless it would be a very serious matter for the country, but the evil is of enormous magnitude, and I do not see the ghost of a chance of getting rid of it unless some such treatment be adopted.

974. Do you think that that single measure would be sufficient?—I have no doubt that it would suffice, if, as a matter of government, it could be carried into effect.

975. If that should not be thought a practicable measure, it would be, in your view, the nearest approach to a remedy?—Yes.

976. You do not approve of killing the cattle?—Certainly I do when you are dealing with the disease in any well-defined small area, and when the killing can therefore be a conclusive process; but when the disease is diffused over the whole country, especially if you continue also to import, what is the use of your killing? You are having an unlimited succession of new patients, who, as fast as they land, take the disease.

977. (*Dr. Quain.*) Your impression is that the disease is a specific fever, and that it is contagious?—Clearly.

978. And probably it is now of less importance to trace its origin than to deal with it as an established fact?—Far less; the question of origin is now a question of historical interest.

979. Even if this Commission should fail to trace out the origin of the present disease, you are satisfied that it could not arise endemically, or generate itself here?—I should not wish to pronounce on what is possible and what is impossible in this matter. But, with the permission of the Commissioners, I will read from my Sixth Report, as Medical Officer of the Privy Council, a passage (pp. 52–53) which, though written about human disease, applies, I think, to the present question:—"The several zymotic diseases are ætiologically quite distinct from one another. . . . How their respective first contagia arose is, as regards nearly all of them, quite unknown. This, in pathology, is just such a question as in physiology is 'the origin of species.' Indeed [regard being had to questions which are still under scientific discussion] it is hardly to be assumed as certain that these apparently two questions may not be only two phases of one. Hourly observation tells us that the contagium of small-pox will breed small-pox, that the contagium of typhus will breed typhus, that the contagium of syphilis will breed syphilis, and so forth,—that the process is as regular as that by which dog breeds dog, and cat cat, as exclusive as that by which dog never breeds cat, nor cat dog; and, *prospectively*, we are able to predict the results of certain exposures to contagion as definitely as the results of any other chemical experiment. But, *retrospectively*, we have not the same sort of certainty, for we cannot always trace the parentage of a given

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"case of small-pox or measles. And here, notwithstanding the obvious difficulties of proof either way, some persons will dogmatise that there must have been an overlooked inlet for contagium, while others will dogmatise that there must have been in the patient's body an independent origination of the specific chemical change. Presuming (as may pretty confidently be presumed) that in the history of mankind there was once upon a time a first small-pox case, a first typhus case, a first syphilis case, &c., and admitting our entire ignorance as to the combination of circumstances under which those first cases respectively came into existence, we have no scientific reasons for denying that new 'spontaneous generations' of such contagia may take place. But as regards some of the diseases, there are conclusive reasons against supposing that this is of frequent occurrence. Where we can observe isolated populations, we find very long periods elapse without any new rise of certain 'species' of disease. For instance, in 1846, the contagium of measles was imported by a sick sailor into one of the Faroe Islands, and led to an epidemic which attacked more than 6,000 out of the 7,782 inhabitants, sparing only the persons who previously had had the disease, and 1,500 who were kept out of reach of contagion; but before that time there had not for 65 years been in those islands a single case of measles." It is the same thing with our steppe-murrain. We know that for 120 years it had not been present in this country—that, at least for that time, it had shown no faculty of "spontaneous generation" here. Nor did any one ever talk of its "spontaneous generation" here till after we had, for the first time, come into direct cattle-traffic with the country where its contagium is always current. To talk of testing "spontaneous generation" then was as if one talked of testing "spontaneous combustion" amid a continuous discharge of fireworks. My report gives a second illustration, which I may quote, in addition to that experience of the Faroe Islands:—"England has 627 registration districts. During the ten years 1851–60 scarlatina, small-pox, and measles were (as usual) prevailing more or less throughout the country, producing among children under five years of age an average annual mortality of 802 per 100,000; *i.e.*, by scarlatina 419, by small-pox 103, and by measles 280. In 626 of the registration districts there were deaths (and, for the most part, in not inconsiderable quantity) from one or more of those causes;—not quite invariably from all of them; for 43 of the 626 (thanks, no doubt, to vaccination) had not any death by small-pox, and among the 43 districts which thus escaped mortality by small-pox, there was one which also had not even a single death by measles;—but, with these exceptions, all the 626 districts had deaths from the three diseases—deaths by measles, deaths by small-pox, deaths by scarlatina. But the 627th district had an entire escape. In all the ten years it had not a single death by measles, nor a single death by small-pox, nor a single death by scarlet fever. And why? Not because of its general sanitary merits, for it had an average amount of other evidence of unhealthiness. Doubtless, the reason of its escape was that it was insular. It was the *district of the Scilly Isles;* to which it was most improbable that any febrile contagion should come from without. And its escape is an approximative proof that, at least for those ten years, no contagium of measles, nor any contagium of scarlet fever, nor any contagium of small-pox, had arisen spontaneously within its limits. I may add that there were only seven districts of England in which no death from diphtheria occurred, and that, of those seven districts, the district of the Scilly Isles was one."

980. With regard to the knowledge possessed on the pathology and treatment of the disease, is that sufficient as recorded, or is it desirable that this Commission should institute careful inquiries into the subject?—I think it would be much to be regretted if so excellent an opportunity as offers itself should be lost without a scientific investigation of the disease. I may say that at the moment when the Commission was determined upon it was under consideration in the Council Office to undertake some such inquiry. Of course, however, your object is to stop the disease, and I believe it will be easier to stop it than to understand it.

981. You have suggested, with a view to stopping the disease, that the movement of cattle should be prevented; do you think there would be any risk in the carriage of dead meat?—Precautions would be of course necessary. If meat were killed in a steppe-murrain slaughter-house, and carcases were sent out with dung adhering to them, that would no doubt propagate the disease; but with decent precautions I think there need be no fear upon this head.

982. Having arrested the disease by forbidding the movement of cattle in the country, how would you prevent its recurrence by the importation of cattle hereafter; would you recommend that there should be a period of quarantine, or a system of inspection?—Quarantine, I imagine, is pretty nearly impossible in this country; but there ought to be no traffic whatsoever with the countries in which the steppe-murrain prevails. I apprehend that a fortnight's quarantine would be, practically speaking, impossible; and even if it were not impossible, it might not be a sufficient precaution to answer the purpose. We know that human quarantines do not answer very well.

983. It might be very difficult to ascertain the existence of steppe-murrain abroad so satisfactorily as absolutely to exclude cattle from the regions where it existed; would it not therefore be safer to have the cattle landed in this country, incurring the additional expense of keeping them for a fortnight under quarantine before they were scattered through the country?—I can hardly conceive a case in which it would be prudent to export cattle from Russia, with or without quarantine.

984. It is now prevailing in Holland and Belgium and Hungary?—Yes. If it is indispensable to import from a country in which the disease is present, quarantine may be necessary. But in any such case, the importation of dead meat rather than of live meat would be preferable, I should think.

985. (*Viscount Cranborne.*) You would forbid altogether the importation of foreign cattle during the period when the movement of cattle has been forbidden?—I would either forbid it altogether, or I would have them slaughtered at the point where they were landed, and surround that place with a variety of lazaret-precautions.

986. It has been stated in evidence that a large proportion of the cattle are now foreign, and considering the effect which the withdrawal of such a number would have upon the food of the population, would it not be better that there should be precautions taken at the Metropolitan Market, and that the animals should be slaughtered there, rather than forbid importation altogether?—The Commissioners, of course, will have infinitely better suggestions made to them than I am able to offer as to whether dead meat should not be imported rather than cattle,—whether, namely, the cattle might not be killed on the other side of the water; if practicable, I think that would be the better course; but, failing that, I should say that slaughtering cattle in the Metropolitan Market ought, if possible, to be avoided, and that it would be better to have special slaughtering places established at a distance from the centre of population.

987. At some isolated place?—Yes, some place down the river.

988. You have discouraged the application to this country of a plan which has been called the stamping out of the disease; should you extend your disapproval to the case of Ireland?—In Ireland I think there is every opportunity—at least I should hope there is—of "stamping out" the disease, if it should arrive there. I am not aware whether it has or

not; but assuming that it has not, and supposing that great vigilance were used, and of course under existing circumstances it is used in Ireland, the first beginnings of the disease would be seen, and then I think it might probably be "stamped out."

989. You think that a cordon might be established, and the animals within that cordon might be killed?—I should think so. There might, however, be difficulties that I cannot foresee, for I do not know the circumstances of the trade in Ireland. If there is a Dublin cattle market, and if the first importations had been to the cattle market, perhaps a number of animals would have been infected, and it might be a month afterwards before the Irish Government would know the extent of the mischief in the country, and by that time it might be difficult for the Government to "stamp it out."

990. Have you formed any opinion as to the period of incubation of the disease?—It varies, I believe, according to the mode of the introduction of the poison; where the disease is inoculated I believe it is four or five days, but where it is caught in the usual manner I believe it is from about eight to ten days.

991. Would you say 10 days as the outside limit?—No; for practical purposes, I should be reluctant to say anything under 14 days.

992. You spoke as a matter of policy of the advisability for the future of not importing cattle from any countries where the Rinderpest existed?—Yes.

993. It has been stated in evidence that it is frequently to be found in Hungary, and that Hungarian cattle are constantly coming across through the German ports. Would you extend your prohibition to those German ports?—No, usually not, for I believe the German authorities are very wide awake as to the danger of Rinderpest; it has been the tradition of this country for a long while that our safety, as indirect importers from Russia, has depended upon the vigilance of the authorities in Prussia and Austria, and the steps they have taken against the disease; and although Austria may tolerate a certain amount of steppe-murrain in Hungary, the authorities become very active indeed when there is any extension of it beyond the remoter parts of the province.

994. Do you know what precautions are adopted, and whether they are extended to the cattle trucks passing through—that is, to the through traffic of Prussia and Austria, as well as to the local traffic?—I do not know.

995. It has been stated in evidence that the most extreme precautions are used with regard to cattle that are to be brought into the country; but you cannot state whether the cattle that are carried through are inspected with equal care?—No, I cannot.

996. (*Dr. Parkes.*) Do you think that any effect has been produced on the public health by the use of meat which has been obtained from beasts that have suffered from Rinderpest?—I have seen no evidence of it.

997. Or from the use of the milk?—I have had no evidence of it. Such book-information as I have would lead me to suppose that it is not likely to be a matter of much importance. From Professor Brücke, of Vienna, two years ago, I learnt that during a recent epidemic of steppe-murrain in Bohemia, the authorities, according to their practice, had the diseased animals slaughtered and buried; but that, as fast as the beasts were slaughtered and buried, the populace dug them up and ate them, and that they were none the worse for it. That is not a tradition, but is on the authority of Professor Brücke, of Vienna, who is a very great light in medicine, a great physiologist. Then in the French accounts of this subject (for instance, in Lévy's *Traité d'Hygiène*) there will be found plenty of cases referred to, in which the meat has been extensively eaten without doing any evident injury to the public health.

998. But no case of that kind has been brought to your notice?—No.

999. Would you suggest that the diseased animals after being killed should be buried, or after what you have stated why should not the meat be used for food and the hides preserved?—It would certainly lessen the inducement to rid the country of the disease if the meat were to be sold.

1000. Looking at the enormous loss to the country of every beast that is affected with Rinderpest, if it can be shown that the meat when consumed has no injurious effects, it would seem to be rather a needless waste to bury it all?—It would be difficult, I think, to prove to public satisfaction that the meat has no injurious effects. On present negative evidence, I would not go so far as to say that. I would only say that I am not aware of any case in which ill effects have arisen, and that sudden and obvious ill effects certainly do not arise. So far as that I would go; but I cannot answer for what may be, after a time, the effect of a continued course of steppe-murrain beef.

1001. Do you know the signs in the muscles by which the disease can be recognized after death?—Dr. Buchanan mentioned to me some time ago that he had found in the muscles the same change as that which Professor Zenker made us acquainted with in the morbid anatomy of typhoid fever.

1002. Have any reports been made to you as to the use of disinfectants in preventing the spread of the disease in any way, or upon what data did Dr. Thudichum found his memoranda upon this subject?—He founded them upon his own chemical knowledge, and upon the German regulations and experience during the many years in which the disease has been watched by the Governments of that country.

1003. In speaking of the shade of doubt which you have in your mind as to the identity of this disease with Rinderpest, I presume you entertain no real doubt?—Not at all.

1004. It has assumed in different epidemics rather different characters, has it not?—Yes, and it is partly with reference to this question that I was anxious at our office to have a long course of post-mortem examinations of the cattle; they have not been made, but the post-mortem appearances in the cases which I have seen have varied a little. For instance, in most of the cases that I saw, there was considerably more affection of the third stomach than appears to be general, according to the German reports. Those claret-coloured patches, and eventually sloughs, that form there, sometimes to a most striking extent, seem to have been more frequent here, as far as I could judge from what I saw.

1005. Have you not, in any cases which have been brought before you, found any additional evidence as to the comparative contagious properties of the discharges from the respiratory and digestive organs?—I have had no opportunity of doing so.

1006. (*Mr. Read.*) You stated that this disease was brought into the London market; have you had any evidence to prove that?—No; I said that I believed so.

1007. Can you give us the date of Dr. Budd's inspection?—I cannot give it you at this moment, but I could perhaps get it for you, for I immediately wrote a note to the Council Office to inform them of the fact. [It was Sept. 7th].

1008. I suppose it was not before the Markets Committee were aware of the disease existing in the market?—No; it was long after; it was when the disease was a matter of the most common notoriety, and in the midst of the public excitement about it.

1009. We have it in evidence that on the 10th of July 200 diseased cows were in the market, and that the Market Committee knew nothing of it until the 26th or 28th of July; your information was received subsequently to that?—At all events it was when the country was well aware that the disease existed.

1010. If imported fat cattle were killed at the outports I presume there would be no danger of spreading the disease from the meat?—I think not.

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1011. Even although the animals were infected with Rinderpest at the time, or that they had the germ of the disease in them ?—Such a slaughtering establishment ought, I think, to be treated with quarantine precautions, and ought to be regarded as a sort of lazaretto.

1012. (*Mr. Ceely.*) I think you look upon the dead flesh of diseased animals as objectionable to be eaten, and very objectionable to be carried about. Might it not be a source of infection ?—I cannot say that it might not be, but I have no facts within my own knowledge upon the subject.

1013. Would there not be great probability of its being a source of infection ?—Undoubtedly it would be best to be on the safe side.

1014. (*Dr. Quain.*) If these cattle were killed, would not the persons who killed them themselves become the means of communicating the infection ?—Of course they might.

1015. (*Mr. Ceely.*) Supposing the cattle to be diseased and slaughtered, to eat the meat might be harmless, but it might not be harmless to carry out such a system ?—That is quite possible. The anxiety of the cattle owners to get rid of the disease, their motive to do so, would be greatly lessened if they could always sell their meat.

1016. Have you seen several post-mortems ?—Yes.

1017. Do you or not look upon the affection of the mucous membranes as inflammatory ?—I think it is inflammatory.

1018. Have you seen many ulcerations ?—Yes ; but where there have not been ulcerations, I think the diffused catarrhal state of the mucous membrane has been sufficient sign of inflammation.

1019. (*Dr. Quain.*) Does it more resemble influenza in the human subject than typhus fever—its depressing influence and the catarrhal discharges ?—It can hardly be said to resemble typhus fever. It perhaps has more affinity with typhoid fever, more affinity in so far as it is eminently, though not exclusively, a bowel-fever.

1020. It resembles that more than influenza ?—I think so.

1021. (*Mr. Ceely.*) Judging from your reading and your knowledge of the Rinderpest as it occurs in Galicia and in Russia, you think that the present outbreak in this country resembles it ?—I think so ; I think it is substantially the same disease, with possibly some minute shades of difference, but the same disease ; I have no doubt of it. The communicability of the disease to sheep is a striking fact in the same direction. In Germany, that fact has been well established by all sorts of observations, including inoculation and experiments. And now that experience has been repeated in this country by observations as to the communicability of the disease to sheep.

1022. (*Dr. Quain.*) Has any information been obtained as to its communicability to other animals ?—Yes, as to goats.

1023. And to horses or buffaloes ?—To buffaloes I should suppose it to be communicable ; but I have no definite knowledge of the fact.

1024. (*Mr. Read.*) And to all ruminating animals? —Probably.

1025. (*Mr. Ceely.*) Have you seen any sheep that were affected ?—No, I have not been able to go to see any.

1026. (*Mr. Wormald.*) Do you believe that if the flesh of an animal having this disease were salted and kept for some considerable time, say, a fortnight or three weeks, it would be as likely to communicate the disease as fresh flesh ?—I suppose that if you could disembody the contagium of the disease, and put it in salt and water, at the end of three weeks it would be inert ; but I have no knowledge on that subject.

1027. (*Dr. Playfair.*) Have there not been instances of human plagues and human diseases which have frequently visited this country, but which now no longer visit it ?—Yes.

1028. To what, generally, do you attribute the fact that although these plagues exist in other parts of the world, they do not take root in this country ?—The question is a difficult but enormously interesting one. I suppose that the fact in its full import cannot be otherwise explained than by supposing that there are great cyclical differences of chemistry on the surface of the earth.

1029. Do you not think it a fact that the improvement of our hygienic and social habits has had very much to do with preventing plagues coming into this country ?—I do not think that the difference must be attributed entirely to that.

1030. But very largely so ?—Largely, perhaps, but not exclusively. Epidemics, after periods of absence, return without any ostensible deterioration in common sanitary circumstances. For instance, let this be observed with regard to diphtheria :—three centuries ago there was diphtheria throughout Europe ; and then it was lost sight of for a long while ; then in the middle of the last century there was diphtheria again : it prevailed considerably in England, and after a while sank again to nothing ; but now, after an interval of a century, we have had it severely again.

1031. You, as a sanitary officer, in combating diseases coming to this country, attach, I presume, great importance to the improvement of the hygienic conditions of the population ?—Yes, certainly, but not indiscriminately. I have no present hope that by any sanitary measure—speaking in the common sense of the word, that is to say, by any nuisance removal measures, one could get rid of small-pox. I do not know what may have been the first rise of small-pox, but I dare not suggest that by any amount of soap and water and drainage you can prevent small-pox in this country. I would beg leave, in this connexion, to quote a passage from my first Annual Report. Scarlatina had been prevailing in the town and neighbourhood of Conway, where the sanitary administration was about as bad as it could be—nuisances of all kinds abounding : but very careful local investigation had failed to show, either that the disease had been comparatively absent from the better-conditioned dwellings, or that its more fatal visitations had belonged with any marked preponderance to the worse-conditioned dwellings. And, in commenting on this fact, I observed as follows :—" The common infectious " diseases of childhood—the 'diseases which occur to " most persons once in life,' cannot, during the " present state of knowledge on the subject, be " spoken of as products of local uncleanliness, or, " without exaggeration, have the word preventable " applied to them in the sense in which it is applied " to typhoid fever, and to epidemic or endemic " diarrhœal diseases. The former diseases, whenever " called into existence (and among us, now, they never " cease to exist) appear to have their distribution " essentially determined by the intercourse of infected " with susceptible persons. Crowding and imperfect " ventilation (such as are common in the houses of " the poor, and by no means entirely absent from the " houses of the rich) directly favour this process of " contagion ; the same, and, probably, other sanitary " faults render the resulting infections generally more " fatal to life than they would be under opposite con- " ditions ; perhaps even they augment the suscepti- " bility to contagion ; but it does not appear that any " hitherto-attained excellence of common sanitary " circumstances ensures a marked immunity from the " affections referred to, or even an entire escape from " their severe and fatal forms. Nothing is yet " certainly known with respect to the primary source " of measles, scarlatina, small-pox, and hooping- " cough. On analogy, it is quite conceivable that they " may first have arisen in the world from peculiar " conditions of domestic filth, and that similar specific " conditions may now from time to time originate " new outbreaks. But these suppositions are not yet " established as facts in science; and only in propor- " tion as they are probable can it be hoped that " common sanitary improvements, which will certainly

" banish some other diseases, will also destroy the " sources of those ordinary dangers of childhood. " With confidence, however, it may be anticipated " that, under the influence of such improvements, " those diseases, though their sources be not extin- " guished, will become greatly less destructive of life " among persons who contract their contagion."

1032. But plague was a disease of the kind that we are dealing with just now ; it could be inoculated, and now it does not exist in this country ; but what I want to arrive at is this : is it not important, in the present state of alarm, to effect every possible improvement in the sanitary arrangements made for the stalling of animals ?—Certainly ; that would be an unqualified gain.

1033. With regard to many other diseases, quite independent of Rinderpest ?—Yes ; I have no doubt that it would be an unqualified gain. But it would not do to promise that measures of that kind would make any difference in the existence of steppe-murrain. I suppose that the Russian steppes are very well ventilated, and yet the disease has its home, if not its birth-place, there.

1034. But the animals may be badly used and fed in their long marches ?—Possibly.

1035. And may be over driven ?—Possibly.

1036. There must be certain conditions under which the bodies of animals receive the contagion as well as the contagion of the virus ?—Yes.

1037. Ought we not therefore to endeavour to bring the bodies of the animals into such a condition as to render them not susceptible of the contagion ?—That would be most desirable indeed. But you cannot hope, I think, to do more in the matter of cows than we have done in the matter of men. And think how powerless we are to make people insusceptible of scarlet fever, or of small-pox, or of cholera, if they are to be exposed to the specific cause. We cannot do it.

1038. But you make people much less susceptible of typhus fever if you put them in well-ventilated and well-drained houses, although the typhus is there ; it attacks ill-ventilated and badly-drained dwellings where there is a badly-fed population ?—You, perhaps, do not render the people less susceptible of the cause, but you certainly render the cause less powerful.

1039. And when you have placed them in better hygienic conditions, typhus fever does not attack them ?—If you had a cow living under model hygienic conditions, but pricked its skin with a lancet charged with the steppe-murrain virus, all the excellence of its hygienic conditions would not preserve it.

1040. Was not that exactly the experience obtained from the plague when it existed in this country, that it attacked the well-conditioned as well as the ill-conditioned, but after improvements were made in the condition of the population it vanished altogether ?—Typhus, you know, attacks the physician of the Fever Hospital as much as it attacks the poor people who are brought to the hospital.

1041. Certainly, when the virus is once established; and what I wish to know from you is whether we might not get into such a condition that the virus will not establish itself ?—No doubt that would be most desirable. But, for much prospect of success, if success be in any way attainable, you must, I apprehend, begin at the fountain head of the disease on the other side of Europe.

1042. Are you aware that in 1745 and 1865 the disease on both occasions spread from the dairies and Metropolitan Market of London ?—Yes. And I suppose there cannot be difference of opinion upon the point that London is a most undesirable place for dairies, if, as I suppose, the milk could be brought in from the country.

1043. In proposing to stop the movement of cattle, you spoke in a medical sense, and not with reference to whether it was practicable or not ?—Yes.

1044. You think it would be desirable ?—Yes. There is no hope, I should think, medically speaking, of stopping the disease unless that is done. That the disease may spontaneously die out is possible, and I cannot say that it will not do so. But it went on for 12 years before.

1045. Are you aware of Professor Röll's opinion in Vienna, that there are always epidemic conditions in the atmosphere when such a plague becomes general ; he states that it is for many years on the Polish frontier without entering Austria until certain diseases appear both amongst the cattle and men, and then it becomes general. He is strongly of opinion that mere contagion will not spread it rapidly, unless the country is at the time susceptible to disease generally ?—There is no doubt that the rapidity with which a contagious disease spreads in a country does vary according to external or (as I may say for want of a better word) atmospheric circumstances : there is no doubt of that. We see, in our human epidemics, that small-pox kills a great many more people in one year than it does in another, and scarlet fever in the same way. Starting from a minimum year of scarlet fever, there will be a gradual increase of the disease for several years, and at last a maximum year of perhaps enormous fatality, three or four or five times as much as in the minimum year, and then the disease will gradually fall down again to its original minimum ;—the contagion meanwhile being always present in the country.

1046. When you stated that you thought that this disease might be domiciled here, like typhus fever or small-pox, you are aware that there have been repeated outbursts of it in almost all other countries in Europe, and that it has been put down ?—It has been put down by a minutely organized system of police, and a system of merciless slaughtering with compensation.

1047. It appears that in the last great epidemic in Austria in 1861–62, 296,000 were attacked, 143,000 recovered, 152,000 died, and only 1,537 were killed. A Prussian professor, who was examined before the Commission yesterday, stated that the slaughtering only takes place when the number is small, and that when the number is larger, they do not attempt to slaughter ?—But they have cordons, of course.

1048. Always ; you would perhaps think it desirable for the Commissioners to obtain the experience of foreign authorities with regard to inoculation ?—Certainly ; it is on record, and the Commission could easily have it ; but I cannot conceive that under any circumstances inoculation will be desirable for adoption here.

1049. (*Mr. Lowe.*) It has been stated that cows were almost exclusively the animals that were attacked in London ; can you suggest any way of accounting for that ?—Simply perhaps that they were the only bovine animals resident in London.

1050. No ; they were not exclusively cows at the market ?—But the other animals are not kept in London. They migrate through London, or are at once slaughtered in it. Cows (in use for milk) are the only stationary animals.

1051. (*Chairman.*) You have spoken of the experience gained abroad as to the cattle plague. Do you believe that foreign physicians and medical men have treated many cases with a view to curing them ?—Yes. I believe that to a very large extent, and from time immemorial, the physicians of Prussia and Austria have been waging war against this disease, by all sorts of means, on the eastern frontier.

1052. Have any returns been made to the Privy Council Office which will show the extent of the disease now in England ?—My colleagues may have had such returns, but I have not been dealing officially with the disease. I have been acting merely as an amateur.

1053. You have spoken of its being desirable to prohibit almost entirely the importation of cattle from Russia ; would you extend that to Northern Russia as well as to Southern Russia ?—I think so. I do not see why not, for unless there were a very vigilant

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system of internal quarantine in Russia, the extension would be indispensable to our safety.

1054. Do you not think that that internal quarantine is enforced there ?—I am not thoroughly informed upon the subject.

1055. Your recommendation as to preventing the removal of cattle would apply, I presume, also to sheep ?—To some extent, certainly.

1056. Do you consider that sheep might communicate the disease ?—Sheep undoubtedly communicate the disease to one another, although in a less degree, in a considerably less degree, I believe, than oxen. And morever they also (which is a very important matter) communicate the disease to oxen.

1057. Have you any account at the Privy Council Office as to the means taken on former occasions in order to prevent the spread of the disease ?—No doubt the Privy Council possesses information on the subject, but I am hardly able to speak to that ; my work is under a special Act of Parliament, and the work that is done in relation to cattle diseases has been done under another Act of Parliament.

1058. (*Dr. Quain.*) Is there any other matter to which you wish to direct the attention of the Commission ?—Perhaps I may mention one matter that occurs to me. I think it would be very useful if, when the Commission makes its final recommendations, it could suggest some plan for promoting the cultivation of veterinary medicine in its highest degree in this country. I believe that the number of highly educated veterinary practitioners in this country is not large ; and the state of the science altogether in this country, I imagine, is not as satisfactory as it might be. But means could be devised to develop it. And if I were to mention an expedient which occurs to me, it would be something of this sort,—that some few hundred pounds should be allowed annually to the University of London, to be spent on the establishment of examinations for honours in veterinary medicine ; when the candidates should be required to show themselves thoroughly proficient in common physiology and pathology,—proficient, I mean, up to a degree that would earn them honours in physiology and pathology, if they were candidates in human (instead of veterinary) medicine ; so that the honours should represent considerable scientific acquirement ; and the candidates should also have to show proficiency in the scholarship of veterinary medicine, beyond the degree which is required for an ordinary pass examination at the Veterinary College. A thousand pounds spent in that way every year would, I think, do a great deal towards improving the study of veterinary medicine in this country.

1059. (*Professor Spooner.*) Are you not aware that the students are examined in physiology and pathology by a member of the University of London ?—I am.

1060. (*Dr. Parkes.*) It has been supposed, I believe, that the rinderpest was introduced into Upper Hungary a few years ago by oxen that were apparently healthy ?—Possibly.

1061. In reading, have you met with any instances of that kind, that beasts apparently healthy, and which remained healthy, were the means of introducing the disease ?—Passing from beasts to men, we constantly see in our practice that the physician carries home scarlet fever to his children without taking it himself,—carrying the infection in his dress, or about his person.

1062. How can we prevent merely by inspection the spread of the disease ?—By any system of single inspection (as apart from prolonged quarantine observation) you cannot do so. I suppose that the cattle which brought the disease into this country (if they did bring it, as I believe they did) were incubating the disease. I do not suppose that they were evidently suffering from steppe-murrain, but that they were apparently healthy.

The witness withdrew.

Adjourned till to-morrow, 12 o'clock.

Thursday, 12th October 1865.

PRESENT :

Earl Spencer.	Mr. Read.
Viscount Cranborne.	Dr. Quain.
Mr. Lowe.	Professor Spooner.
Dr. Lyon Playfair.	

EARL SPENCER in the Chair.

Mr. W. Smith.

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Mr. William Smith examined.

1063. (*Mr. Read.*) I believe that you are a member of the Royal Veterinary College ?—I am.

1064. Are you Inspector of the Norwich Cattle Market ?—I have been so since 1848, and am now.

1065. Are you Consulting Veterinary Surgeon to the Norfolk Cattle Plague Association ?—I have the honour to be so.

1066. Can you tell the Commission of the three original outbreaks in Norfolk ?—I can tell the Commission of two.

1067. We will take the Reepham case ?—I am more prepared with the North Walsham case.

1068. Then take the North Walsham case. Will you give us the date of that outbreak ?—It was about the 3d of July. The beasts were upon Norwich Hill on the 1st of July ; that is to say, 38 Irish steers, and they travelled to North Walsham on the night of the same day, in connexion with about seven head of foreign beasts, into the North Walsham district.

1069. Whose property were those animals ?—They belonged to Messrs. Storey, Gee, and Watts, cattle dealers.

1070. How many of them died of the cattle plague ?—Nearly the whole. I do not know that more than three or four survived. Of the original lot of 38 Irish beasts, 36 died, and I think that four or five of the seven foreign beasts died.

1071. I understand that there are not above four convalescent ?—There are not.

1072. Did the disease spread to the farms of Mr. Bidwell, Mr. Wrench, and Mrs. Barber in the neighbourhood of North Walsham ?—Yes ; the disease spread to the farms of Messrs. Bidwell, Johnson, Wrench, Cutting, Barber and Sewell, Horsfield, Harvey, Bailey, Youngman, and Bastard.

1073. Have you any means of knowing about how many cattle died in that district ; are you aware of something like 150 ?—I should think that that would be about the number.

1074. Was there much difficulty in tracing the disease from one farm to another, in this instance ?—I think no difficulty.

1075. Then there is no reason for doubting that these cattle of Messrs. Storey, Gee, and Watts brought the disease into that neighbourhood ?—There is no doubt of it.

1076. Do you know whether or not the foreign cattle came from the Metropolitan Market?—I have strong reason to believe that they did.

1077. What is the state of the disease now in that district?—In that immediate district it is nothing like so severe as it was. I think that they have not bought their store beasts yet, they are chary of doing so. In one farm of Mrs. Barber's, I have an exact list of what she lost with the value, &c. from her own hand.

1078. In the early period of the disease, I suppose, there was great prejudice and great ignorance on the part of the farmers, and the disease spread very rapidly?—There was very great ignorance, and the disease spread very rapidly in consequence.

1079. And since better precautions have been taken, the disease has almost subsided in that district?—In that particular district.

1080. Why do you think that the disease has subsided in consequence of precautionary measures?—I think that the best measure which has ever been adopted was the six weeks' prohibition, under the direction of the Cattle Plague Association, for persons to purchase beasts.

1081. Will you take the Reepham case; will you state to the Commission the origin of that outbreak?—They were a lot of bullocks bought on the same day on Norwich Hill, and I have great reason to believe that they also came from the Metropolitan Market, and stood near some infected cows.

1082. Who bought the cattle on Norwich Hill?—Mr. Stephen Leeds of Whitwell; there were 26 of them.

1083. How many of those are alive?—I am not prepared to say; I think that the statements made with regard to those beasts are not quite correct.

1084. It has been reported that 50 per cent. of them recovered?—That is perfectly true; I know that one-half of them died, and two cows which were infected.

1085. You visited this stock?—Yes.

1086. Have you every reason to suppose that they all had the plague?—I am not prepared to say that.

1087. Did a very large per-centage recover, or escape?—A large per-centage is reported to have escaped. I have never seen that in any other neighbourhood, and I am not satisfied that it is a correct account; 13 died, and nearly half are living.

1088. You cannot account for it?—I believe that the statement is not correct; there may be an error.

1089. Did the disease spread rapidly there?—Yes.

1090. Particularly from Whitwell Common?—Yes.

1091. Are there many cases of disease now prevalent in that district?—I think not many; I am not acquainted with many.

1092. There are stock, I believe, still suffering in the parish of Ling?—I believe so; but I do not know it from my own knowledge.

1093. That I believe was introduced by a man removing his cattle from Whitwell Common?—I am not sufficiently acquainted with the matter to say. A lot was sent to Thimblethorpe, and they carried it from Thimblethorpe to Mr. Dacks.

1094. Whose cattle were those at Thimblethorpe?—They were a portion of Mr. Leeds's; eight of the 26 were sent to Thimblethorpe, five of which died.

1095. We have had before the Commission the evidence of Professor Brown, who said that cattle belonging to Mr. Ireland in that district were not within a mile and a half of any infected cattle; do you know that case?—Yes, I saw the cattle; it was the case of Mr. Ireland, of Wood Dalling. As far as I can recollect, it was so. I am not at all sure that there had not been intercommunication between them and the men attending the cattle diseased.

1096. Can you tell us positively of there having been intercommunication?—I think that there was a probability of it.

1097. Do you know anything of the Harleston outbreak?—No.

1098. On the 12th of August, the Cattle Plague Association for Norfolk was established, and one of the clauses of the rules of the association was, that no member of the association should purchase cattle in any market for the space of six weeks. You have said that that is a very wise precaution?—I firmly believe it to be a most wise precaution.

1099. During that period of six weeks we will take first of all the case of Burgh St. Peter; will you tell the Commission how that case occurred?—Mr. R. C. Hammant, of Somerleyton, in Suffolk, bought 12 Irish steers, about two and a half years old, on the 22d of July, on Norwich Hill; there were two or three others upon his farm. They all died, and only two of the Irish steers remained on the day when I was there.

1100. How did the disease spread further?—It then went to Sir Francis Crossley's. I think his farmsheds are about half a mile from Mr. Hammond's, and there it destroyed several animals; the cows were affected, and many head of stock were destroyed.

1101. We will now come to the spread to the Burgh St. Peter Marshes in the county of Norfolk?—I have reason to believe that it travelled first from Mr. Hammant's in an angular direction, to the farm of Sir Francis Crossley, and that it passed over the River Waveney and the meadow for about three quarters of a mile to the oxen of Mr. J. Hammond on the Burgh St. Peter Marshes; it either travelled through the air, or was carried by the men attending Sir Francis Crossley's stock to these marshes.

1102. Have you any reason to suppose that Sir Francis Crossley's men went to Mr. Hammant's Burgh Marsh in that direct way or in an indirect way?—Yes; I believe that they get mushrooms upon these marshes, and it is not at all impossible that some of the men who have been connected with these cattle of Sir F. Crossley's have travelled upon these marshes in search of mushrooms.

1103. What was the result of that outbreak upon Mr. Hammond's marsh?—That we were obliged to slaughter 20 of those very fine beasts; one I think was buried, and the rest were slaughtered, as soon as they were seen to be a little amiss, and sent to the meat market.

1104. Did not one bullock die from the plague, which was ordered to be buried, and did not a deputation from the Norfolk Cattle Plague Association go to the marsh, and was it not there agreed that on the next bullock sickening the whole should be killed?—Yes; except that I do not think that the first bullock died; he was ordered to be killed, and was buried; there is no doubt that he would have died.

1105. The whole of that lot were slaughtered?—Yes, and some of the others of the smaller lots belonging to the same person took the disease.

1106. And they were also slaughtered?—I believe so.

1107. What has been the result of that; has the disease spread in that neighbourhood?—I think not.

1108. You think that those rather severe measures were the means of stopping the disease?—I do.

1109. Are you aware how many of these bullocks, which were slaughtered apparently healthy were in reality affected with the early stages of the disease?—I do not know of my own knowledge, but I have heard upon good authority that five or six showed symptoms of the disease when they were slaughtered.

1110. They showed symptoms of the disease on the post-mortem examination; they exhibited nothing of the sort when they were allve?—They exhibited no particular signs of the disease while they were alive; but signs of the disease were traced after death. That is only a statement which I heard; I do not make it as my own.

1111. But it was made on the authority of the

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inspector, was it not?—I can hardly say that it was made on the authority of the inspector.

1112. Will you take the case of the outbreak at North Repps, and state how it occurred?—There had been four calves belonging to Messrs. Storey, Gee, and Watts, which had been sent from North Walsham down to the fields at Horstead, seven miles on the road to Norwich Market; these beasts contracted the disease, and three died of it, and were buried before I saw them, except that I turned them off the hill on the market as being in a state of disease a few days prior, and the other was in such a state of disease that I recommended its destruction, and it was destroyed.

1113. Those were the four calves which died at Horstead?—Yes; there was a bull which had been purchased from an adjoining farm, and two others of Mr. Ling's heifers were removed from some marshes to be taken home as usual at that time of the year, and they stayed for a night upon this occupation of Messrs. Storey's, where these calves had died. The bull shortly after getting home to North Repps exhibited symptoms of the disease; he recovered. The two heifers which were driven took the disease, and died.

1114. Did it extend any further?—I have not heard of its extension.

1115. Will you state what you know of the Wickhampton case?—They were a lot of bullocks which were bought off Norwich Hill during the prohibitory period by Mr. Ives, of Wickhampton, they were 22 Lincoln oxen—they cost 17*l.* 15*s.* a head—and they were bought at Norwich Hill on August the 19th; one was observed ill on the 22d, it was killed on the 24th, and buried, and all the rest which I saw afterwards were in a state of disease, and I believe died, or have been killed in consequence of it.

1116. Was there any extension of that disease?—Yes; and I have reason to believe that a cow at Blofield caught the disease, having been stationed within a few feet of the road where these cattle were passing.

1117. They passed through Blofield?—I believe that they did. I do not state it as a positive fact.

1118. Is the disease still extending there?—I have heard that it is.

1119. Are you aware how many stock have died in the adjoining marsh?—I am not aware.

1120. Will you tell the Commission what you know about Mr. Wardell's bulls?—I know that several of them were exposed upon Norwich Hill, and I certainly noticed their general unhealthy appearance; but as I could not perceive a positive case of the Rinderpest so as to place the matter beyond doubt, I believe that they remained. Some were afterwards killed. I believe that they all either died or were killed. On the subsequent Saturday, one was bought by Colonel Stracey Clitheroe of Rackheath, and another bull from some one else. I think that they had been home about 11 days when the bull was taken, and he died after three days suffering; only two or three days prior to their being taken they were put to the cows, and up to this date the cows remain in perfect health, they were with the bulls only about 12 hours, I think, before any appearance of the disease exhibited itself. The other bull died within about a week, from a virulent form of Rinderpest.

1121. Do you say that these bulls, when the disease was incubating in their system, were sent to a healthy lot of cows?—Yes; they assumed a very healthy appearance according to the proprietor's opinion, and they were sent to the cows.

1122. And the cows have not shown any signs of the disease since?—They have not. Precautionary measures,—a profusion of chloride of lime and other disinfectants were used by Colonel Clitheroe.

1123. The natural period of incubation has passed?—Yes, as far as we know. I am not exactly positive about the period of incubation, but I believe that it has passed.

1124. You have stated these cases to the Commission; in almost all of them I suppose that you trace the disease to newly purchased cattle, or cattle which had been drifted for a considerable way?—I do.

1125. Since the 23d of September, the day on which the prohibited six weeks of the Norfolk Cattle Plague Association expired, can you give us any further cases. Do you know the case of Mr. Arms, at East Tuddenham?—I have heard of it, and believe it to be perfectly correct. He lost all the beasts which he got.

1126. How many did he lose?—I do not know the number; six or seven.

1127. Will you take the case of Mr. Ireland, of Sall and Caistor?—Yes. He had 30 Durham oxen, four years old, purchased on the 15th of September of a dealer. They travelled from Bixley, were driven over the cattle market at Norwich at five in the morning, before the market beasts were there. They were purchased on the 15th, and sent home on the 16th. On the 19th or 20th they were found to be suffering from foot and mouth disease, the remains of which are now apparent, and some of the oxen were then affected with Cattle Plague. On the 25th one was found dying, or dead, and many of the others were affected.

1128. Do you know how many he has lost; is it not 16?—Yes; two of the beasts died of the disease, and 12 or 14 were slaughtered in a diseased state, I believe.

1129. I think that you know of other cases which have occurred. Will you state to the Commission your opinion as to the advisability of stopping store markets for a time?—You mean all the store markets of the kingdom.

1130. Not exclusively in the infected districts, but in the healthy districts as well?—I think that it would be desirable to close all the markets, unless other means of a safe character could be introduced, such as compelling persons moving cattle to present a clean bill of health for 13, 14, or 16 days before they move them from the spot where they are living.

1131. You seem to be of opinion that a great portion of our danger results from markets?—Markets, and moving cattle from place to place in railway trucks particularly.

1132. What is your opinion with respect to railway trucks?—My opinion is that they are in a most dirty condition, that they are a productive source of contagion, and of spreading the malady.

1133. You say that they are in a dirty condition; do you mean now or that they have been so?—They have been so within the last week or ten days. I have complained, and alterations are now in the course of being made.

1134. What is your opinion as to the supervision of government inspectors?—My opinion is that nothing is more wanted.

1135. How would you have that supervision?—I am hardly prepared to devise a scheme; but I think that one or more in every county, and the most intelligent and responsible person in the county, should have a supervision over the young and inexperienced men who are now acting as inspectors.

1136. When you say intelligent and responsible men, you, of course, mean members of the veterinary profession?—Of course I do, and the best of that class.

1137. Are you of opinion that the system of compensation, as afforded by cattle associations, will materially help to check the progress of the disease?—It will materially help; but the more liberal the compensation is the more available the help will be, and the more good it will do, I think.

1138. Do you not think that the lack of that compensation has been the means of spreading the disease in the early stages?—I do.

1139. What is your opinion as to the Cattle Plague extending itself to sheep?—I am doubtful on the point.

1140. Can you recommend or suggest any precautions which should be generally taken besides the stoppage of the market?—Strict inspection of the

railway trucks at every station where they are used for the conveyance of cattle, and of the lairs, and enforcing a thorough cleansing and whitewashing of the roofs, floors, and all parts of the carriages, which is not now done.

1141. Can you suggest any precautions against the spread of the disease, besides the stoppage of store cattle markets?—I should recommend the stoppage of the travelling of cattle as much as possible from place to place, especially in the infected districts, and if it could be made practicable, I believe that a bill of health of cattle, when moved, would be desirable.

1142. Are you prepared to suggest to the Commission the total stoppage of all traffic in cattle for a time?—I believe that it would be a very effective measure, but I am not prepared to give such advice. I should not like to take the responsibility of advising it.

1143. I think that in addition to your other qualifications which you have mentioned you have been inspector to the Norfolk Cattle Farmers Association?—Yes, I have been consulting veterinary surgeon and inspector to them ever since they were established in 1848.

1144. And you have seen different diseases in cattle all over the kingdom in connexion with your duties as respects that association?—Nearly all over the kingdom, and in Scotland I have been investigating pleuro-pneumonia and diseases of cattle.

1145. What is your opinion as to the general state of health of the cattle apart from the Cattle Plague?—In Norfolk I think that we are healthier than usual. In other parts a good deal of pleuro-pneumonia prevails. I might perhaps add that the foot and mouth disease has broken out again in Norfolk, and prevails very much; with the exception of this and the Rinderpest, the cattle are healthy.

1146. Would you extend your observation to sheep as to being particularly healthy?—No; sheep are particularly unhealthy; lambs in particular.

1147. (*Viscount Cranborne.*) I understand you to suggest that you would like to add to the prohibition of store markets the prohibition of moving cattle from place to place. Would you absolutely forbid their being moved from any cowshed in the United Kingdom where they are now, to any other cowshed?—Yes; in the infected districts.

1148. Your wish would be to proclaim districts?—Yes; it is a very crude suggestion; it is not a matured one.

1149. How would you carry out the requirement of a clean bill of health, which you propose, as a preliminary to the permission to travel by railway?—I scarcely propose it; it is merely a suggestion. I think that a competent person should be called in to examine the beast, and to make inquiry in the neighbourhood whether any disease within a certain number of days, 15 or 16 days, probably, had appeared in the herd, and if it had not, and if the animals were healthy, I think that they might be moved with safety.

1150. You think that no cattle should be allowed to be moved in any part of the kingdom without the certificate of a veterinary surgeon to that effect?—I am hardly prepared to go so far as that. In infected districts I think that some such rule should be observed.

1151. By a veterinary surgeon you mean a surgeon who has passed the Veterinary College?—Yes.

1152. Have you any idea of the number of those persons in practice?—I can very soon tell you the number.

1153. Would there be a sufficient number to furnish facilities for such a plan for any considerable part of the country?—Yes, I think so. There are I think 40 in Norfolk in about 900 parishes. Judging from the county in which I live I fancy that it might be carried out.

1154. Are a great number of those persons who profess veterinary science in your county passed veterinary surgeons?—No; I think not. I think that only a few throughout England are passed veterinary surgeons, a great number, I am afraid, are not.

1155. Are the 40 whom you have well distributed throughout the county, or do they mainly reside in the great towns?—I think that they are pretty well distributed.

1156. In some of the cases which you have spoken of, I have heard you speak of contagion being carried by men, and not by the movement of cattle?—Yes. I think that I have one case where it can be traced to no other cause. One of these dealers belonging to Messrs. Storey, Gee, and Watts went into a yard for the purpose of purchasing some bullocks, and one bullock, as is sometimes the case, followed him and licked his clothing. I understood, and he afterwards confessed, that he had a cow at home, somewhere in the neighbourhood of North Waltham, affected with the disease, and that he had lost other stock. In five days this bullock which licked the man in the yard was affected with the disease, and I believe died, and they could trace it to no other cause.

1157. How far was this bullock, which was supposed to have caught the disease by licking the man, from the herd which was actually infected?—I do not know; I forget the circumstances.

1158. (*Mr. Read.*) It was some few miles, as a matter of course?—Yes, it was not near, and if it had been within a mile or two it would have been near.

1159. (*Viscount Cranborne.*) Are there any cases within your knowledge of contagion by cattle passing along a railway or road without any actual communication of cattle?—The infection has been communicated across a river as well as a road. In the case of Mrs. Barber the disease was carried across a road.

1160. Have cattle passing along a railway or a road, within your knowledge, communicated the infection to cattle feeding by the side of that railway or road?—Not strictly within my knowledge. I should think that a herd of infected cattle passing along a road would most certainly affect healthy cattle in the pastures near that road, especially if there was a gate connecting the field with the road not hurdled, so as to prevent close contact. We now hurdle them up in Norfolk to prevent the disease being communicated. I have no doubt of the disease being communicated by a road.

1161. Should you say, from your own knowledge, that a larger amount of contagion was produced by cattle going into infected places, or touching infected cattle, than by its being communicated from men passing from one set of cattle to the other?—I am not prepared to say. I do not think that our knowledge is at present sufficiently extensive to answer that question.

1162. You cannot say whether men have extensively acted as the vehicle of the contagion?—I am inclined to think not extensively; but that the cattle themselves have positively affected other cattle.

1163. (*Dr. Playfair.*) Have you had any secondary outbreaks in any of those districts where the disease was stamped out?—I do not remember one.

1164. What precautions did you take to disinfect the litter and the manure in cases where the disease was stamped out?—The usual precautions which we have been adopting there,—we slash their bodies.

1165. I refer to the litter and the manure?—The litter in some cases has been burnt, and in other cases it has been well saturated with chloride of lime.

1166. And has that been found effectual to prevent the further spread of the disease?—I have reason to believe that it has; but our knowledge of this disease is yet in its infancy. We cannot speak very strongly on that, or upon any point connected with the Rinderpest, at least I should be very sorry to do so.

1167. (*Mr. Lowe.*) Have you got rid of the disease altogether?—No; we have more of it than ever. It lulled during the six weeks prohibition; but it is now

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spreading in the villages, with a rapidity which it is shocking to contemplate.

1168. Can you show exactly how it works in the market; how do the diseased beasts now come to market, in your opinion?—I think that the disease originally came from the Metropolitan Market, and that it now also comes from the Bury and other markets. There are three markets now supplying us, the Metropolitan, the Bury, and the Peterborough markets.

1169. Do you think that the Norfolk farmers supply you?—I think not, to any extent.

1170. Supposing that a man finds his beasts diseased before any one else does, is it not a great temptation to a poor man to send his beasts to market?—Yes; I have known various clumsy and negligent means adopted, I hope more from ignorance than from design.

1171. According to your experience would the hide of cattle carry the infection?—I think so.

1172. Has any fact of that kind come to your notice?—No.

1173. Why have you not renewed the six weeks' prohibition?—The president of the Norfolk Cattle Plague Association will be able to tell you.

1174. We would rather hear it from you than from him, if you happen to know it of your own knowledge?—The feeling of the dealers and some farmers was against it.

1175. They suffered very much from the suspension of the market?—No doubt; but there is a large root crop now in Norfolk required to be eaten, or it will entail a large loss upon the farmers.

1176. Was the feeling of the farmers in favour of returning to the market?—I do not feel prepared to answer the question.

1177. But the disease is now raging in Norfolk?—Very much.

1178. (*Dr. Playfair.*) Has it reached districts from which it was expelled?—I doubt very much whether it has; not to any extent, for the reason that they have not commenced buying their store beasts; they are holding off as long as they can. I am not prepared to say that it will not, and that some of the slovenly covered carcases or superficially covered pits may not produce a second outbreak. I am rather inclined to think that in some cases where burial has been negligently done it will.

1179. (*Chairman.*) How far do the regulations of the association extend in Norfolk?—Throughout Norfolk.

1180. As I understand, it is a voluntary association?—Yes; but I think that a very large portion of the Norfolk farmers have connected themselves with it.

1181. During the time of the prohibition you think that no fresh cases have arisen?—Those who did not purchase during the six weeks' prohibition had no cases; many of those who did purchase were sufferers.

1182. And they were not members of the association?—No; but unfortunately they brought the disease to members of the association. I have an instance of it to-day.

1183. With regard to the system of a separation of animals bought, you do not think that that is completely effectual?—I think that it is not completely effectual. Of course a system of quarantine would have a tendency to protect the other stock of a farmer on his farm.

1184. Do you believe that it protects the animals which were on the farm before the purchase?—I think that if the animals are kept sufficiently far from the newly purchased ones, if the newly purchased ones should become affected it may protect them.

1185. Will you state what this system of separation is?—To put newly-purchased cattle in as remote a place from their other stock as possible.

1186. For how long?—I believe 15 days.

1187. Have you any instance where stock bought and put in this quarantine communicated the disease to those stock which were before on the farm?—I believe there has been no instance, because the time is very new; I think that it is hardly up.

1188. What was the effect of the prohibition in Norwich Market?—It had a very great effect indeed. On one Saturday it reduced the number to 131 head of beasts, that was on August the 19th, and on August the 26th there were only 180 beasts in the market, and the market continued very thin until the prohibitory season had expired, varying from this number to 170.

1189. (*Mr. Lowe.*) Then what did it get up to?—I am not prepared exactly to state the number, but some hundreds. Perhaps the largest quantity on a Saturday, which is the market day at this period of the year, would be between 2,000 and 3,000 beasts, under ordinary circumstances.

1190. (*Chairman.*) Have you, as an inspector, found any diseased animals in the market recently?—Not in an actual state of Rinderpest. I had occasion to turn off 44 some time since which were in such a condition that I considered it was my duty to turn them off; they had many of the symptoms of Rinderpest. I also had occasion to turn off four beasts of Storey's for the same reason. Last Saturday I observed a general unhealthy appearance among numbers of the beasts; there was a suspicious character about them which I did not like, without being exactly able to say that it was Rinderpest.

1191. There has been no prohibition of markets or fairs at Norwich?—None.

1192. Did you try to trace the cases to London?—Yes.

1193. Did you distinctly trace them to any dealer in London?—I could not give you the names of the dealers; but the chairman of the Cattle Plague Association was with me, and we were assured that the beasts were in the Metropolitan Market the week before they came to Norwich on July the 1st. I do not remember the name of the man.

1194. It is your impression that sheep do not suffer from this disorder; but do you believe that sheep can communicate the disorder to oxen?—I believe that they can.

1195. Has there been any case in Norfolk, within your knowledge, where that has taken place?—I understand that at Blakeney that is said to be the case. I do not say that the sheep are visited with Rinderpest. I have considerable doubts about it; it may turn out to be wrong.

1196. (*Mr. Read.*) You have heard Mr. Lowe's question as to the temptation to a man to sell his stock in the market when he finds them to be diseased; do you not think that that temptation is very much reduced when they receive compensation from an association?—Very much.

1197. And perhaps that may be one reason why we Norfolk farmers have been so virtuous on this particular occasion?—I should be sorry to libel them so much as to admit this. I believe the majority of the Norfolk farmers to be persons of worth and integrity.

1198. What is your opinion as to the origin of the disease?—That it is of foreign origin; Russian origin.

1199. And highly contagious?—The most contagious that I have ever met with, and likely to be the most calamitous to this country.

1200. (*Mr. Lowe.*) If the disease goes on without any check, what will be the result of it?—That it will kill three fourths of the cattle in the country, and that eight tenths will take it. I think that it will even kill 80 or more out of every 100 that are attacked.

1201. (*Dr. Playfair.*) Has your mortality only been 80 per cent.?—I think that it has been rather more than 80 per cent., perhaps 90 per cent.; it is a very fearful calamity.

The witness withdrew.

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1202. (*Mr. Read.*) I believe that you are a member of the Veterinary College ?—I am.

1203. And you have a very extensive practice as a veterinary surgeon in Norwich and the neighbourhood ?—Yes.

1204. You have heard Mr. Smith's evidence ?—I have.

1205. Do you generally agree with what he has stated ?—In every particular I do not agree with him; but in the main there is not very great difference in opinion between us.

1206. I need not trouble you to go over the ground which Mr. Smith has gone over. As to the facts which he has given to the Commission there is very little doubt that they are perfectly correct ?—They are perfectly correct, I have no doubt.

1207. I will direct your especial attention to the extraordinary outbreak of the Cattle Plague at Mr. Harvey's at Crown Point; will you detail that case to the Commission ?—Mr. Harvey had a very serious outbreak about the 28th of August, or perhaps later; but I have reason to believe that there were two or three cases which had died something like a week or ten days before that period, which it was imagined had died from lung disease, but which I have no doubt were cases of Cattle Plague, though I did not see them. He had located on Crown Point about 120 young bullocks, from perhaps 12 to 18 months old and approaching two years. He shortly afterwards bought a lot of animals younger, 43 in number, which made something like 160 or 170. So virulent was the attack that not a single bullock on his estate escaped. I do not mean to say that they all died; but I really believe that if they had not been shot, as a great many of them were, by order of the inspector, half a dozen of them would not have escaped. I do not think that more than two would. It was one of the most virulent outbreaks which I ever witnessed in my life. I may not have seen quite so many cases as Mr. Smith has, but I have seen a very great number, and a more virulent attack can scarcely be imagined, as the result has proved. Every head of cattle from the Crown Point estate has gone.

1208. Can you at all account for the outbreak ?—I have no doubt in my own mind that it arose from certain animals, probably a portion of those animals mentioned by Mr Smith, having been located within 400 or 500 yards of Mr. Harvey's property, not immediately upon it but at not a greater distance than that. Two bulls died without any one seeing them or knowing anything at all about them, and they were buried, and the outbreak occurred very shortly after the burial of these bulls. They were seen by no one, nor were the first cases of Mr. Harvey's, for unfortunately he published a letter in the local papers in which the disease was treated rather lightly, and he was not willing afterwards when the outbreak came to let the people know much about it; but the magnitude of it was such that of course it could not be hushed up in any way.

1209. Have you any reason to suppose that what has been recently reported as to some Dutch cattle on Mr. Harvey's grounds going there had anything to do with the outbreak ?—A statement was made to me by a man residing on the spot; he assured me that very shortly before the outbreak some stranger appeared in the neighbourhood of Norwich with some Dutch cattle; they were located on Mr. Harvey's property; two of these cattle died, and were disposed of in rather a mysterious manner. The man immediately took the rest away, and they never went on to Norwich Hill at all, but where he went with them no one knows; that, however, is merely a statement.

1210. You have no doubt in your mind that either from these Dutch cattle, or from the bulls which had been on Norwich Hill, and which died in the immediate vicinity of Crown Point, Mr. Harvey's cattle became affected ?—I have very little doubt that the outbreak there occurred from the contagion or infection.

1211. Will you state what you know with respect to the Crown Point sheep ?—The Crown Point sheep commenced dying almost immediately after the lot of cattle died. There were 43 cattle which had been recently purchased by Mr. Harvey, and before all that lot died he began losing sheep in immense numbers. I was not called upon to attend them in any way, but going backwards and forwards to vist these bullocks I kept my eye upon the sheep; and, seeing half a dozen dying right and left, I was induced to watch them narrowly, and a great number of them died before anything was said about their having died. They were depasturated upon the same land which these bullocks had been feeding upon. They still continue dying. Mr. Harvey had, I think, originally something like between 2,000 and 3,000 sheep, and up to the present time I have reason to believe that he has lost fully half of them. I think that about 1,200 sheep have died; in fact, there is a cart continually going to take up the dead bodies, and they are being buried daily.

1212. I suppose you are aware that the sheep have not received the best treatment, as far as regards food ?—I am quite aware that they were living on grass, and grass only. They had no artificial food of any kind, and no roots.

1213. And I suppose that you would consider from the dry weather which we have had lately that sheep of that description, in order to be in proper health, would require some artificial food ?—Undoubtedly.

1214. They were put in the park, I believe, when it was in a very luxuriant condition ?—They were put in the park rather before the rains in July. There was not then very much herbage, but it immediately afterwards sprang up very freely indeed, and they partook of it very freely; but we had afterwards drought again, and the place has been very much scorched up until the rain of the last day or two has come.

1215. Having stated these facts as to the treatment of the sheep at Crown Point, will you state your opinion as to the nature of the disease with which they are attacked ?—The symptoms during life are as similar as they possibly can be to those exhibited by animals labouring under Cattle Plague, and the post mortem appearances are similar; there is pneumonia, and a tendency to disease of the lungs. You do not see it in every case, but in a great many cases you have congestion, and perhaps hepatization of the lungs; but the principal morbid appearances are precisely similar to those exhibited by cattle dying from Cattle Plague. It appears to be a disease of the mucous membrane throughout.

1216. Is it your opinion that these sheep die from Cattle Plague ?—I am quite sure that the cattle die from Cattle Plague, but I am not quite so certain as to the sheep. I entirely withhold my opinion until certain experiments have been carried out.

1217. Those experiments being in progress, you will not of course say anything about them ?—I can tell you the result as far as they have gone; the proposition was made last Saturday, and up to the last evening we know what the result is.

1218. What has been the result of the change of the food of sheep ?—I think that there has not been sufficient time to ascertain it.

1219. I will now ask you respecting Mr. William Birbeck's cattle at Thorpe ?—They were located on the opposite side of the river to the Crown Point cattle, and an outbreak took place. I believe that four were killed and buried, and the remainder of the lot were slaughtered, and sent to market. I have heard that several other cows immediately adjoining where Mr. Birbeck's cattle were have died, but I do not know of my own knowledge as to the exact number.

1220. (*Mr. Lowe.*) What is the width of the

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river?—I should think that the river would, perhaps, be about 100 yards wide; it is the River Yare running from Norwich to Yarmouth.

1221. (*Mr. Read.*) You have every reason to suppose that this outbreak on the other side was caused by the affected cattle at Crown Point, and have you not also every reason to believe that there was no direct contact between one lot of cattle and the other?—There was no direct contact, because they could not in any way cross the river.

1222. There was no communication from one side to the other?—Only by Mr. Harvey sending his cows, which would pass very close to Mr. Birbeck's cattle.

1223. But perhaps not much nearer than on the other side of the river?—About the same distance.

1224. Do you know anything as to Mr. Waite's cattle?—Yes. The first case was in the opposite direction to Mr. Birbeck's, from Crown Point. The first case was at Mr. Woolsey's, which is an adjoining farm. The next five or six cases were on the farm of Mr. Waite, but it leaped over a farm to get to Mr. Waite's,—supposing that the animals were affected by Mr. Harvey's cattle. He lost, I think, seven or eight. I have lost one; but I purposely kept free from stock. But yesterday before our association we had a very large dealer, who has a farm immediately adjoining mine, and a most serious outbreak has taken place there, inasmuch as 25 lean beasts were killed last evening by order of the inspector, and several others are in a very unsatisfactory state.

1225. The disease has spread from Crown Point in all directions?—Certainly.

1226. Your opinion is that it is spread by atmospheric causes as well as by contact?—There has been no direct contact. There could not by any possibility be any contact with Mr. Birbeck's stock, and there could not be with Mr. Colman's, because it is on the other side of the river; and with regard to Mr. Woolsey's and Mr. Waite's animals, I believe that there could be no contact. Mr. Harvey's stock were all buried on the spot, and not removed.

1227. Do you believe that flies could carry the contagion?—I cannot say; we had legions of them in the very hot weather. The flies themselves did not suffer.

1228. Do you think that it would be advantageous to stop store markets for a time?—I am quite of opinion that it would be desirable to stop the great assemblage of stock which necessarily occurs in all fairs and markets.

1229. What is your opinion as to the origin of the disease?—That is rather a vexed question. I am quite certain that it is highly contagious, and highly infectious; but I am not prepared to say that there may not be some other influence at work.

1230. (*Dr. Playfair.*) You mean to say that there may be some atmospheric conditions?—There may.

1231. (*Professor Spooner.*) That is to say in this country?—I am not so strongly impressed with that opinion as I was at an early period of the outbreak in Norfolk.

1232. (*Mr. Lowe.*) Of what opinion?—As to its being atmospheric. I am certain that it is spread most quickly, both by contact and by infection.

1233. (*Mr. Read.*) Do you believe in its spontaneous origin?—I believe the thing to be almost impossible; but nature will not let you into her secrets, and I cannot answer the question.

1234. (*Dr. Playfair.*) What do you exactly mean by infection, as distinguished from contagion?—I mean by one animal breathing the air which has been breathed by a diseased animal.

1235. (*Mr. Read.*) You are quite of Mr. Smith's opinion, that the prohibition of the Norfolk Cattle Plague Association from purchasing stock in the market for six weeks was judicious, and the result satisfactory?—I think decidedly so.

1236. You also think that associations which grant compensation to owners of stock are productive of great good?—Yes.

1237. Not only to the owners of cattle themselves but also as to the spread of the disease?—I think that the instructions issued by the association have acted so far as a remedy. There is very great difficulty with regard to isolating stock, particularly upon the premises in Norfolk. Mr. Stroyan, who is a very large dealer, when there was a very serious outbreak, of which we were informed yesterday, strongly urged the association to prohibit fairs, in which he was joined by another very large dealer, Mr. Coleman.

1238. (*Mr. Lowe.*) You said that you differed from Mr. Smith in some respects. What are your differences?—I am not quite certain whether the disease is of foreign inportation; I have every reason to believe from what I have heard that it is.

1239. Is there any other point in which you differ from Mr. Smith which you would like to state?—Without pronouncing that the two diseases are identical, my opinion is, I think, rather stronger than Mr. Smith's, that the disease is Cattle Plague in sheep, likewise, that the same disease is attacking sheep which has been attacking cattle; and I ground that opinion on the fact of the disease in the sheep following so immediately on the Crown Point Estate, where the attack was so virulent with regard to cattle.

1240. How came the sheep to be put on the pasture where cattle had been fed just before?—There was a very large quantity of pasture newly laid down, and there was an abundance of feed in the month of July, and Mr. Harvey's intention was to have sold everything out, but unfortunately he could not do it.

1241. Does Mr. Harvey disbelieve in contagion?—I think that he is not a believer in contagion. I believe that he quite pooh-poohed the idea of Cattle Plague being a serious matter at all. Mr. Harvey has published on the subject, and therefore his letters are to be read.

1242. He argued against the disease being contagious?—I think that he did, and it is rather singular that he should have had such a serious outbreak.

1243. (*Dr. Playfair.*) Has there been an equal mortality with meadow fed cattle and with stall kept cattle?—The greater number of cattle which have been kept in Norfolk have been grass fed cattle.

1244. In meadows?—Yes; it is not usual to keep cows entirely with stall food, particularly in Norfolk.

1245. Has there been more disease amongst cows than amongst oxen?—I think not in Norfolk.

1246. (*Professor Spooner.*) Are you thoroughly satisfied of this disease being different from any other disease which you may have seen as affecting cattle; have you had an extensive practice?—I have been in practice for about 30 years, and have never seen anything like it before.

1247. Either in the bovine or in the ovine animals?—Neither.

1248. You look upon it as an entirely new disease in your experience?—I do.

1249. Does that in any way govern you in your conclusion with regard to the causes tending to its production?—Yes, to a certain extent it does. I am less inclined to think that it arises from atmospheric causes. I think that it is conveyed from one animal to another in some mysterious way, and perhaps from causes which we do not yet know.

1250. Have you in your experience seen disease affecting oxen and sheep which has assumed what is designated as a typhoid or a typhus disease, similar to diseases which are so termed in the human subject?—I have seen cases similar, I think, to typhoid fever, but certainly not to anything like the extent which is seen in this Cattle Plague. In fact I have never yet myself witnessed a single case of cure of true Cattle Plague. I do not mean to say that cases have not recovered; nature very often makes a very vigorous effort, and cattle may recover; but with regard to the Crown Point bullocks, every animal has died.

1251. (*Viscount Cranborne.*) You have spoken of certain mysterious sources as the means of propagating

the disease. I suppose that the majority of cases of cattle disease have been propagated, not in those mysterious ways, but by actual contact ?—The greater number decidedly.

1252. (*Chairman.*) Will you state the date of the outbreak at Crown Point ?—I think that it would be between the 20th and the 28th of August ; but I did not see the cases in the first instance. Mr. Harvey did not call any one in. I only heard of them afterwards.

1253. You say that you differ in some degree from the opinions of Mr. Smith as to the character of the disorder ; what is your opinion of the origin of it in Norfolk ?—I have no means of judging of the origin.

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Mr. Smith is the inspector on Norwich Hill. I have heard what he has said with regard to the disease being introduced from the Metropolitan Market. I have no knowledge at all myself upon the subject. My impression was, that when the outbreak took place at Crown Point it had not arisen from any cattle with which those cattle might have come in contact ; but afterwards I saw reason to alter that opinion.

1254. (*Mr. Read.*) Your opinion differs from that of Mr. Smith, but it in no case amounts to a contradiction ?—Certainly not.

1255. It is only a difference in degree ?—Certainly.

The witness withdrew.

Mr. William Sharp examined.

Mr. W. Sharp.

1256. (*Chairman.*) You are bailiff to Lord Sydney ?—Yes, I am.

1257. Lord Sydney's estate is at Frognal in Kent ?—Yes.

1258. State the extent of arable and grazing land on the farm you superintend ?—There are about 80 acres of arable land, and 300 odd of grazing ground.

1259. Has he many cattle on the farm ?—He had 13 dairy cows and 11 store animals before this disease came on, and 300 sheep.

1260. Where were the dairy cows and those 11 store animals pastured ?—In the park, at different ends of the park.

1261. Is the park enclosed in any way ?—It is divided into several parts by fences, and one part by a short wall.

1262. Is there any wall round the whole of the park ?—No.

1263. It is enclosed like an ordinary farm ?—Yes.

1264. Will you state to the Commission what occurred to those cattle ?—One was seized at first with the disease, and was sent away before it was certain that it was the complaint it was taken with ; in eight days afterwards four of the others were seized.

1265. Will you give the date of the first seizure ?—I think it was on the 21st of August.

1266. Was it a cow that was seized ?—A steer.

1267. What became of that steer ?—The steer was sent in a hospital cart to an infirmary ; but being worse on arriving there was sent to the knacker's.

1268. Where ?—It was sent to Greenwich.

1269. Was it not sent by your orders ?—It was.

1270. Do not you know where you sent it ?—I did not see the exact spot that it was sent to.

1271. What orders did you give to the man who had charge of it ?—I ordered him to make away with it, if it showed any further symptoms the next morning of the complaint.

1272. What did the man do with it ?—He took it away and sent to the knacker's the next morning.

1273. That was on the 21st of August ?—Yes.

1274. What happened afterwards with the herd ?—Eight days afterwards five more were seized.

1275.—What were they ; steers or cows ?—Steers, and they all died.

1276. When did they die ?—Two days afterwards.

1277. The 31st of August ?—On the 1st of September.

1278. They were seized on the 30th of August ?—Yes.

1279. Did you have a veterinary surgeon to examine them ?—I had, and an inspector also saw the five.

1280. What disease did he pronounce it to be ?—The Rinderpest.

1281. Did any of the other animals on the farm take the disorder ?—Three more died of it.

1282. What were they ?—Steers.

1283. No cows died of it ?—No ; the heifers recovered ; two heifers that were there recovered from the complaint.

1284. Were the heifers feeding with the steers ?—Yes.

1285. (*Mr. Read.*) In the same field ?—In the same field.

1286. (*Chairman.*) What is your opinion as to the origin of the disease among those steers ?—I am unable to account for it at all.

1287. How long had those steers been on the ground ?—Six weeks at least in that same place, but they had never been off of the estate.

1288. Were they bred by Lord Sydney ?—Yes.

1289. Had you made any purchases of cattle a short time before ?—I had not, not for 12 months, and then it was only sheep.

1290. You had not purchased any horned cattle ?—No.

1291. When were the sheep purchased ?—I think last September.

1292. Can you give the date of the purchase ?—No ; it was over a year ago.

1293. In 1864 ?—Yes, and I did not purchase any more stock.

1294. No horned cattle or sheep have been purchased on the estate for more than one year ?—No ; there have not been any purchased for more than a year.

1295. Lord Sydney does not take in any joist stock ?—No.

1296. You never do that ?—I have not known it since I have been with my lord.

1297. You never take in any cattle or sheep in that way ?—No.

1298. Was there any disorder among the neighbouring herds or flocks ?—Three miles off, at Eltham, there was some.

1299. What happened there ?—Mr. Green lost a great many.

1300. What was the disease by which he lost the cattle ?—It was supposed to be the Rinderpest, but I did not see them.

1301. Had there been any communication between Mr. Green's farm and yours ?—No.

1302. Is there any river running through your farm ?—There is not.

1303. There is no communication by drainage from Mr. Green's farm to Lord Sydney's ?—Certainly not, I think.

1304. Is there any road leading through Lord Sydney's park ?—Only private roads.

1305. The outside of the farm does not communicate with any turnpike or public road along which the cattle might have been driven from one farm to another, or one market to another ?—There is a wood between it and the road, and some houses, and a short space of wall.

1306. What is the width of the wood ?—250 yards.

1307. And along the private road no cattle passed during that time that you are aware of ?—Not that I am aware of.

1308. (*Mr. Read.*) Your sheep have not taken the disease ?—They have not at present.

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1309. Were they pastured with the stock that died ?—Some of them were.

1310. And they are perfectly healthy now ?—They were healthy this morning.

1311. How many cattle escaped ; you say that two heifers took the disease and recovered ?—That was all that were in the same herd, the nine that died and the two that escaped.

1312. How near were the dairy cows to them ?—About a quarter of a mile from them.

1313. They are now alive and well ?—Yes.

1314. You stated that the nearest case of Rinderpest that you heard of was within three miles. Do you mean three miles by road, or three miles as the crow flies ?—Three miles as the crow flies.

1315. You had not heard of any cattle that were affected with the plague passing by you ?—I had not heard of any; but there are several roads; there might be some.

1316. (*Viscount Cranborne.*) Was it during the very hot weather that what you have described occurred ?—It was hot weather at the time.

1317. Was there a very great number of flies about ?—Yes, a great number, especially round the animals when diseased.

1318. (*Dr. Quain.*) Were there any cattle besides Mr. Green's cattle affected in that neighbourhood ?—I was not aware of any more at the time.

1319. Have any others been affected since ?—Some since.

1320. In what relation to yours or to Mr. Green's were those ; how near to them ?—They were about two miles off.

1321. In the same direction as Mr. Green's, or on the other side ?—A little to the left hand.

1322. The disease had not crossed your park ?—No.

1323. Was there any footpath or private road leading through your park in any way ?—No.

1324. Not the least ?—It was not a direct footpath; there is not a footpath in the same field that the animals were feeding in; there is one about 300 yards off.

1325. Is there any probability that the butchers who had been to see Mr. Green's flock for the purpose of slaughtering them could have gone to look at your cattle ?—I should say not ; they had no business there, and I have not seen anyone there.

1326. Was there any communication by means of dogs, or were your dogs fed on any offal at Mr. Green's farm ?—No ; we had no connection with his farm at all, not the most distant.

1327. Did you go to look at these animals yourself ?—No.

1328. Did any of your people go to see them ?—None of them went to see them.

1329. (*Professor Spooner.*) How long antecedently to the disease showing itself in Lord Sydney's cattle did the disease exist in Mr. Green's cattle ?—I do not know.

1330. Had you heard of the disease existing in Mr. Green's cattle before it broke out among Lord Sydney's ?—I had a day or so before. I only heard it then.

1331. Calling your attention to the first of the cattle that you say was attacked, and which you sent to the knacker's, I think you stated that the symptoms were not so fully developed in that case as in the subsequent cases they showed themselves ?—They were not.

1332. What induced you to send that animal away to the knacker's ?—I was afraid of the disease, and I did not understand the complaint that the animal was labouring under.

1333. Do you mean to say that if all the oxen had shown the same symptoms you would have sent them all to the knacker's ?—No, not after I knew what the complaint was, I should not. I did not remove another after that.

1334. Did you hear what became of it ?—I heard that it was sent to the knacker's and destroyed.

1335. Are you acquainted with any of the parties who are acting under Mr. Green ?—I am not.

1336. You do not think that any communication could have taken place between any of his servants and the servants of Lord Sydney who might have looked after your cattle ?—I think not.

1337. When you say that Mr. Green's place is three miles off, do you mean the Commissioners to understand that where Mr. Green's cattle which were attacked were situated was three miles distant from where Lord Sydney's cattle were located ?—I should say so.

1338. (*Dr. Quain.*) What water did they have to drink ; was it pump water ?—It came out of ponds.

1339. (*Viscount Cranborne.*) Where does their food come from ; off the estate; or do you buy it; or were they merely grazing ?—Only grazing.

1340. (*Chairman.*) Are cattle that feed on the land where these were grazing usually healthy ?—Yes, they are.

1341. You had not any disorder among the cattle on this pasture before ?—Eighteen months ago they had the foot and mouth disease.

1342. Was that brought about by other animals being mixed with them, or did they get it spontaneously there ?—I am not aware ; it took place before I was with Lord Sydney.

1343. (*Dr. Quain.*) Do you recollect in what quarter and how the wind was with relation to the animals that were sick ?—No, I do not.

1344. You kept no register of it at the park ?—No, I do not think we did.

1345. (*Dr. Playfair.*) Were there any strong winds at that time ?—I think not.

1346. (*Chairman.*) Is there any farm intervening between Lord Sydney's and Mr. Green's ?—Several.

1347. Were the animals on those farms attacked by the disease as well as yours ?—I think not until after our animals were all dead.

1348. In the opposite direction to Mr. Green's farm were there any other herds of cattle attacked with the disorder ?—I believe three animals had it.

1349. How far off were they ?—Nearly four miles.

1350. Were the animals that were pastured between those and your farm attacked by the disorder ?—I believe not.

1351. Were you made aware of any cattle travelling along the road, say ten days previous to the outbreak of the disorder ?—I had not heard of any.

1352. Was there any fair at the neighbouring town ?—I think not.

1353. You are not aware of any of the neighbouring tenants having recently purchased cattle in the Metropolitan Market ?—I am not, without it was about three miles off. A butcher bought three, and they died.

1354. (*Mr. Read.*) Did those three pass anywhere near your farm ?—I do not know. I cannot say which way they came.

1355. (*Professor Spooner.*) How many animals in the whole has Lord Sydney lost ?—He has lost nine in the whole.

1356. Upon the average how long did those animals live after the symptoms became apparent ?—Four or five days ; five lived only three days, and two lived 15 days.

1357. Were those which lived 15 days the first that were affected, or were they the last that were attacked ?—That was after the first one was attacked.

1358. They were the first cases that declared themselves after the first one that you sent away ?—Yes, seven days after the first one was sent away.

1359. And those two animals suffered for 15 days before they died ?—Yes, they were the last that died.

1360. In the intervening time other animals were taken ill and died in three days ?—Yes.

1361. (*Chairman.*) You have stated that on the 21st of August one steer was seized with the disease,

nd that no other animals were seized until the 29th f August ?—Yes.

1362. Was the steer that was first attacked a rong and healthy animal ?—He was hardly so ealthy as the other animals; he had not at any me appeared so healthy as the others, and did not ed so well; in fact he was the most weakly one of ne lot.

1363. What was the age of that animal ?—Three ears old.

1364. Had he been subject to any disorder before ? -Only the foot and mouth disease.

1365. How long previously had he had that ?— 5 or 16 months before.

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1366. (*Mr. Read.*) Are you sure that that one bullock died of the Cattle Plague ?—It was destroyed it had not the symptoms very plain at first when I saw it.

1367. Who did see it after it left Lord Sydney's farm ?—A surgeon saw it; Mr. Green, a veterinary surgeon of Greenwich.

1368. Not an inspector ?—No; an inspector was not appointed at the time, that I know of.

1369. Did any veterinary surgeon see the animal ? —Yes; Mr. Green of Greenwich.

[With reference to the evidence given by the next witness, Mr. Sharp desires the subjoined note to be added to his evidence :—

" Mr. George Crowhurst, of Chislehurst, butcher, who occupies land near Viscount Sydney's Park, has not had any disease nongst his animals, and is not in the habit of turning into that field any animals purchased for the purposes of killing for meat. he animals in that field are milch cows, and are perfectly healthy. I do not think that the disease could have been communicated that way.

" With regard to the animals belonging to Mr. Slade and others in the vicinity, I did not hear of any case of Rinderpest amongst eir stock until three weeks after the last animal in Lord Sydney's Park was buried.

" I have made further inquiries as to the origin of the disease in Lord Sydney's Park, but can find no more evidence than stated fore the Commission.

WILLIAM SHARP."]

Mr. JAMES COWIE examined.

Mr. J. Cowie.

1370. (*Chairman.*) I believe you are inspector of me district in the county of Kent ?—Yes.

1371. Will you state what that district is ?—It mprises the Bromley Union.

1372. By whom were you appointed ?—I was first ppointed by the Privy Council for the London strict, and I had for a short time the district of ewisham, Forest Hill, Sydenham, Bromley, Beckenam, and the Crays, but after my appointment by the stices I gave up a considerable portion of the London strict.

1373. You were in fact appointed by the justices a petty sessional division to inspect this district ? -Yes, along with another.

1374. Will you state what you know about the utbreak of Rinderpest in Lord Sydney's park ?—I ceived a telegraphic message from Professor Simonds te on the 31st of August, I think, stating that he ad had a communication from Lord Sydney that the isease had broken out in his herd, and suggesting at I should go there immediately. I could not go at day as it was too late, and I could see nothing the dark; however I went the next morning, and I und that two or three animals had had the disease nd were buried; one had been carried off by the eterinary surgeon to attempt to cure it, as I understood, but it was too ill, and afterwards, when he got to Greenwich, it was destroyed, as I understood. here were several others in the disease when I went ere, they were confined within a courtyard and one fter another they died; two of them stood out for a onsiderable time, those two which Mr. Sharp has eferred to as having lasted for so many days; they id not show any distinct disease until within five ays of their death, one of them especially went oping about and appeared to be rather dull, but it id not show any distinct marks of disease until ithin five days of its death. I suspected it was ıking the disease.

1375. Can you give the Commission any idea as the origin of the disease among those cattle ?—I m sorry that I have had rather a short time to epare, but if I had known that I should have been anted I would have made inquiries, because I think ere are some suspicious circumstances connected ith the matter that ought to be looked into. Mr. rowhurst, a butcher at St. Mary's Cray, has a rother who is a butcher in Chiselhurst; he bought n ox in Romford market, I understood, and he took home to kill; it had the disease, and it communiated the disease to five or six others, all of which ied. He sold a calf, I understood, or a calf was ought from his immediate neighbourhood or preises by a farmer, and that calf gave the disease his stock, and he lost four or five cows. He has a brother who is a butcher in Chiselhurst who has a grass park right across Lord Sydney's, and in fact the road only separates them, and it would have been worth while to have ascertained whether there had been any communication with the brothers, or with their cattle.

1376. Have you not inquired into that matter ?— No; I did not expect to have the honour of being called as a witness here, otherwise I should have done so; if it is requisite I can do so still, but I will here remark that to my certain knowledge in my district two butchers have brought the disease to the district by purchasing cattle at fairs, or at Smithfield, and the disease has been communicated to several others.

1377. That is the only source to which you can trace the disease which broke out among Lord Sydney's cattle ?—Yes, that is the only source to which in the meantime I can trace it.

1378. (*To Mr. Sharp.*) Is it the case that Mr. Crowhurst has a field opposite to Lord Sydney's farm ?—It is not opposite the place where these animals were.

1379. Is it opposite to any part of Lord Sydney's farm ?—It is opposite to the end of a part of the park, and it is separated from that by a road and a thick holly hedge.

1380. What is the width of the separation between the two fields ?—It is almost 50 yards from the inside of one hedge to the inside of the other.

1381. In the field belonging to Lord Sydney that is adjacent to this field of Mr. Crowhurst's had you any stock feeding at the time ?—We had some sheep.

1382. Could this stock communicate with other parts of your farm ?—Our sheep could communicate with our own stock, but not with those of Crowhurst.

1383. Are you aware whether Mr. Crowhurst had any animals suffering from Rinderpest on his farm ?— He has not had a single case on his place.

1384. Is he in the habit of changing his stock frequently ?—He is a butcher, and he generally buys in the London market, but he seldom puts the animals on that farm.

1385. But he does sometimes ?—Yes.

1386. Does he put the animals that he is going to slaughter for a night or a day or two in this field ?— I have not seen any there; he generally puts them in a little meadow close to his house, or in a slaughter-house.

Mr. Cowie.—I wish to say that a butcher has facilities of hiding from the public and from inspectors or the police, and all and sundry, the disease, which others have not; they can of course kill them, and inspectors do not go when they do

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not know that there is disease, nor will they have the information, and they do not go to inspect them. A butcher, seeing an animal in an incipient state of disease, can quietly take it to his slaughter-house and kill it, and that was the case with the butcher in Bromley ; no one knew it, and I daresay he did not know it himself, but he had brought unawares a diseased beast to his premises ; his cows took the disease first, and they communicated it to others ; he took a park in the neighbourhood of Colonel Long's, and Colonel Long a very short time ago had one animal attacked, and then another, and I have no doubt the disease will go on.

1387. You have a considerable district in Kent under your charge now ?—Yes.

1388. Has there been much of Rinderpest in that district ?—In the western portion of it there has been a great deal, but not in the eastern.

1389. When did it break out in the western portion of your district ?—It broke out about the middle of August. I believe that Mr. Crowhurst's case was about the first.

1390. To what do you attribute the origin of the outbreak in your neighbourhood ?—We can trace it in every case to infection satisfactorily, except in Lord Sydney's case.

1391. From what quarter did the infection come ?—The infection came from London.

1392. Has it been invariably so ?—Almost ; there is a large dairyman in Lewisham whose stock I attended first, and the disease was communicated to his cattle by a number of Dutch cattle that he bought in Copenhagen Market, and by that means he infected the whole of that district ; there were hundreds which died or were sent away in consequence of that alone.

1393. Had those Dutch cattle been standing in the market for any time ?—No, I think not. They were brought down and put in Beckenham Park 22 of them, and they were only three days there before the disease broke out ; 16 of them died, five have recovered, and one has died since from pleuro-pneumonia.

1394. Can you see any reason why the eastern part of your district should be unaffected with the disease, while the western part is affected ?—The only reason I can give is, that they have more communication in the western district with the London market. The eastern is better supplied with country markets.

1395. Were any special regulations made for the purpose of preventing the spread of the disease in the eastern district ?—I do not think so ; there was no inspector appointed before I was.

1396. Have you reason to believe that the present system of inspection works satisfactorily and tends to prevent the spread of the disorder ?—I do not think it will ever be stopped until there is some arrangement made with regard to the butchers ; they drive the cattle from the London market along the road and these infect the districts as they go along.

1397. You believe it is possible for healthy animals to be affected by diseased cattle when passing along a turnpike road ?—I do decidedly think so.

1398. Would you extend that observation to a railroad ?—Yes, I would ; the instincts of the animals and their olfactory nerves are much more powerfully sensitive than those of a human being, and I think they are more subject to infection than a human subject.

1399. Have you known any instances in which cattle grazing in a field near to a railway have caught the disease from cattle passing along in trucks ?—No ; but I know of an instance that occurred the other day with General Dacre's cows. I called upon him. I was inspecting Mr. Slade's cows at the time, and I pointed out a bull that was bad with the disease. The wind was blowing right towards his cows, and I said to him, "You may depend that you will have "the disease among the cows, but whether or not "you should remove them out of reach of the infection, or of the wind ;" but he said, "Why, it is "about 300 yards off ; there is no chance of it ;" but in three days one of his cows took the disease, and they all, five or six, died in the course of a short time.

1400. Without having had any contact whatever ?—Yes ; there was a public road between them for one thing, and a large field, and the bull was in the middle of the field, and he could not remove from that place.

1401. Did you investigate that case in order to ascertain that there had been no communication whatever between the diseased bull and the cows ?—There were on the other side Mr. Green's cattle, about two or three fields off, much further than in the case of Mr. Slade, but I attributed it to infection from Mr. Slade's stock, and I do not believe that they were within 300 yards of the general's cattle.

1402. There were no persons passing from one herd to another, or any dogs ?—Not that I am aware of. I know that they were very particular at General Dacre's place not to allow any person to cross their field at the time for fear of the disease.

1403. Did the cows drink water that came from the other place ?—No ; the pond was 300 yards distant from the general's.

1404. There were no other means by which these animals could have been infected except by the atmosphere ?—No other means whatever ; I should never consider that cattle were safe within many hundred yards of diseased cattle.

1405. (*Viscount Cranborne.*) How many hundred yards ?—I could give no limit, but we can ourselves detect a bad smell half a mile off. The offal of fish or the entrails of cattle, if allowed to lie exposed on a hot day, can be distinguished a great distance off. There is an exudation from the excrement and from the nose and the eyes which has a most peculiarly offensive smell, and which I believe contains the essence of the disease.

1406. Is that characteristic of the Rinderpest ?—Yes ; some half dozen or a dozen cattle affected in that way would spread the disease abroad.

1407. (*Dr. Quain.*) Do you mean the smell comes from the fæces or from the nose ?—Yes, from the fæces, and from the nose and the eyes and the skin.

1408. (*Chairman.*) You entertain an opinion as to the manner in which the disease is communicated which is rather different from other opinions, you do not think that it is communicated entirely by contact ?—No.

1409. What remedy have you to suggest in order to put a stop to the disease ?—I think that the fairs must all be stopped for a month at least, that is as short a quarantine as I should recommend, and further that all cattle should be killed that are sold to butchers without being taken away from the city, in fact that they should not be allowed to go away.

1410. Do you think that that could be practically carried out in the country ?—Quite well ; they have all the conveniences provided, they could get to the slaughter-houses and have the animals killed in the town ; it would only be for a short time.

1411. At the present time, I believe, in the city there is a regulation that no animal should be sent to the Metropolitan Market except for slaughter ; is that strictly carried out ?—It is carried out, but not to this extent that a butcher at Bromley cannot purchase a beast and drive it off along the public road.

1412. You do not think that any plan would work efficiently unless the animals were actually killed on the spot ?—No, I do not.

1413. (*Viscount Cranborne.*) You were speaking of butchers buying cattle in the Metropolitan Market and taking them down to your neighbourhood for slaughter, how long do they keep them before they slaughter them ?—For several days frequently ; in hot weather, for instance, they do not kill them until just the day before they require them.

1414. Do they keep them in the neighbourhood of other cattle ?—They frequently have paddocks in

their immediate vicinity, not perhaps close to their slaughter-houses, but within half a mile, and they put them into those paddocks or they put them into their own sheds.

1415. And these are cattle to which the inspectors cannot get, and of whose condition they have no knowledge ?—Yes ; they may have the disease as it is called in the first or second stages without any inspector knowing anything at all about it, and the butchers have facilities for concealing the state of matters that no other person has, and therefore I think that more than ordinary stringent regulations should be made with regard to them.

1416. (*Mr. Read.*) What is your opinion as to the origin of the disease ?—I have simply the information that other people have, that it has come from abroad. It is undoubtedly a specific disease with which we have hitherto been totally unacquainted, and we are led to believe that it is of foreign extraction.

1417. Did you ever see the like before ?—Never ; in pleuro-pneumonia sometimes it exhibits the same appearance, and in one or two cases among Lord Sydney's cattle there was hardly any exudation from the nose or the eyes, but still there were other symptoms which would indicate the Rinderpest. I now speak about their appearance during life, but we had a post-mortem examination made of one of Lord Sydney's cattle.

1418. You have read of the symptoms of the Rinderpest in foreign countries, and you suppose the disease now in this country to be the same ?—Yes.

1419. And that the varying symptoms are such as you would expect from the difference of climate ?—Quite so, and from the constitution of the animals ; the constitution of the animals must be, to a certain extent, different here.

1420. You would prohibit the holding of all fairs and markets in the country for at least a month ?—Certainly.

1421. Would you allow markets to be held for the sale of fat stock for slaughter in the provinces ?—No, I would not. In Scotland, in infected districts particularly, they have prohibited all markets being held, or fairs of any kind, for from a month to two months, and this with the entire concurrence of farmers and others ; and they have no difficulty in getting cattle, they can go to their next neighbour who wants to sell and buy cattle, knowing that they are healthy ; they supply themselves in that way, and very little inconvenience indeed is felt from stopping the markets for a time, for the purpose of attaining such a great end.

1422. (*Viscount Cranborne.*) Has not this prohibition had the effect of raising the price of meat in all the towns in Scotland ?—As far as it has gone it has lowered the price. In the Edinburgh Market yesterday the price was only 9*s.* and 9*s.* 6*d.* for 14 lbs., and the sheep were sold at 4*s.* 6*d.*; it has not raised the price in the meantime, but it has rather lowered it.

1423. (*Dr. Playfair.*) What is the reason of that ?—It is because they are selling as much as possible for fear of the disease, for one thing ; when the disease breaks out they kill the healthy animals to save them from being diseased, or lost.

1424. (*Mr. Read.*) You have quoted the price of meat in the Edinburgh Market, it would appear therefore that the Edinburgh Market is not closed ?—It is closed except for those animals which are to be slaughtered immediately.

1425. It is closed with respect to store stock ?—Yes ; but the country fairs are stopped entirely.

1426. (*Dr. Quain.*) Have you any knowledge of any of the diseased flesh being consumed by the people ?—No.

1427. Do you believe that butchers send much diseased meat to market ?—It was my own butcher who had the diseased beast that gave it to his own cows, and I perhaps ate part of it myself, but I do not know.

1428. Do you know whether there are any means by which the flesh could be recognized as that of a diseased animal ?—Not unless the disease has gone to a considerable extent.

1429. What appearance does the meat then exhibit ?—It turns green after being killed for some time ; it might be killed and disposed of immediately afterwards, or within an hour or two afterwards, or two or three hours, without being discovered.

1430. It does turn green more rapidly than the flesh of healthy animals ?—Yes ; it turns also to gangrene ; that is, when it is in the second stage. I should say not in the first stage.

1431. (*Professor Spooner.*) Referring to the slaughtering of animals, suppose that an animal unmistakeably affected with the disease was slaughtered, and its carcase was conveyed from the place to a distant part, do you think that the flesh so conveyed would be likely to impart the disease to any other animals ?—Not if the skin was off.

1432. Then you do not think that the same danger would arise from the transmission of a dead carcase as from the living animal ?—No, I do not think so.

1433. Have you any reason to give for that opinion ?—I am supposing that the head and skin are both gone ; if you had them, and the exudation from the nose and the eyes was there, a smell might proceed from it ; but if you have decapitated the animal and skinned it I do not think it is likely.

1434. (*Dr. Playfair.*) And the intestines taken out ?—No ; I am supposing that they are not exposed.

1435. (*Professor Spooner.*) You do not think there would be any danger of communicating the disease by the flesh of the dead animal ?—No.

1436. (*Dr. Playfair.*) Do you mean with the intestines of the animal still in it ?—Yes ; if the intestines are still contained in the abdomen without its being opened up, that is to say immediately on the removal ; but I think after a time that the intestines might communicate the infection to the surface of the body, and so communicate the disease ; it is a mere matter of opinion.

1437. (*Professor Spooner.*) I was speaking merely of the flesh of an animal being conveyed from place to place for human food ; an animal under those circumstances would be deprived of its intestines ?—I do not think, unless where the disease actually exists, such as in the intestines and the stomach and the head, it would be communicated simply by the flesh of the animal.

1438. (*Dr. Playfair.*) Would you permit the carcase of an animal with its head off to be transported from one place to another with the intestines still in, which you know form the seat of the disease ?—No, I would not allow that ; I am supposing that the animal is immediately killed and decapitated and skinned, and carried off, for instance, to be buried. The flesh simply, entirely apart from any of the affected organs, I do not think would communicate the disease.

1439. (*Mr. Lowe.*) You say that in Edinburgh no beasts are now brought to the market, except for immediate slaughter ?—Yes.

1440. What security is there that they are immediately slaughtered ?—The purchasers are subject to a heavy penalty if they are not slaughtered. The inspector will have his eyes about him, and also the police, to see that they are not removed beyond the city.

1441. They are taken to a slaughter-house and killed ?—Yes.

1442. Are the butchers allowed to keep them at the slaughter-house for any time ?—I believe not ; they are not allowed to keep them beyond a certain time.

1443. Does that appear to you to be a sufficiently stringent provision ?—No. There is of course danger attached to their being conveyed from their place of abode to the market.

1444. No precaution is taken against diseased

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beasts being sent to the market?—None, unless by the railway officials.

1445. Who have no interest in the matter?—They simply instruct their servants to watch, and to see that no diseased cattle are put into the trucks.

1446. Even the market in Edinburgh, in your opinion, had better be discontinued for some time?—Yes.

1447. You would prohibit all markets all over the country?—Yes.

1448. And let the butchers go to the parties who have cattle to sell, and have them slaughtered there and carried away?—Yes; unless some extraordinary measures are adopted I am satisfied that we shall not get clear of the disease.

1449. Do you think that if the markets were closed for a month they would get rid of the disease?—Yes, unless it was imported again from abroad.

1450. Would you suggest any further precautions with regard to cattle being imported from abroad?—Not unless there was a longer quarantine enforced.

1451. There is great practical difficulty in having quarantine at all, is there not?—Yes, there is; but there are no other means that I can see, unless the animals are killed at the port where they are landed.

1452. Would that, in your opinion, be an advisable step?—At all events I think it would be where the animals are suitable for being killed; but so many of them come to us for the purpose of being fattened, that it would almost amount to a prohibition to kill them.

1453. How so?—Because there are so many lean cattle that come, and it would be a great sacrifice with regard to the parties sending them if they were to be slaughtered on the spot.

1454. You think that it would prevent their sending lean cattle?—Yes, I do.

1455. Still, taking into consideration the difficulty that we are in, such a step would be advisable, would it not?—I do not go that length, for it must be observed that we must carry it out for a longer period than a month; in fact we should be continually exposed to infection from abroad, and there must be some permanent stringent measure adopted with regard to importations from abroad which is not requisite for our home consumption.

1456. I do not quite gather from you what you think that measure should be?—With regard to importations from abroad the only means are to make them serve a long quarantine. I do not think that a fortnight would be sufficient. There was one case which occurred among Mr. Slade's cattle; he removed two or three animals from his infected cattle and put them in another field, and they were quite healthy for three weeks and a day or two, and then one of them took the disease and they all three died.

1457. They had been in a state of incubation for three weeks?—Yes.

1458. How could you practically work out a system of quarantine without introducing the disease into the country?—You cannot do it, but you could act very stringently for a time—at all events, until we were quite certain that we were not dealing with countries where the disease existed.

1459. Supposing, for example, that a shipload of cattle arrived to-day and another to-morrow and another the next day, you would have to put them all together?—No; but the fact is that there are such enormous supplies got from abroad that there is great difficulty in it.

1460. If any one of those animals was infected at the place of quarantine it would not do to use that place again for quarantine. You would not put fresh beasts there?—Not until it was cleaned out.

1461. The difficulties would be endless, would they not?—Yes, as to foreign cattle. The great point is to prevent cattle at the other end being exported; and without inspectors abroad, and there being interested parties abroad, we cannot prevent it.

1462. Do you think that inspection, taking it altogether, is a thing that we can rely upon in order to prevent the importation of diseased cattle?—No, I do not. I think that if the disease exists abroad we shall be always more or less liable to infection.

1463. Is not the nature of inspection this, that when we are in a panic and alarm it is very vigilant and good, and then in quiet times it naturally relaxes?—Yes; it is so very often.

1464. With regard to the inland markets, is the only measure that you would recommend this, that the markets should not be held?—That is one measure.

1465. Does not it often happen that when a market is forbidden the farmers meet on some other field a few miles off and hold a sort of market of their own?—No, they do not do that; they are so frightened in Scotland where the disease prevails that they would not venture to buy a beast in a market.

1466. But did they not do so at Croydon a short time ago?—Yes, but that was because they did not get sufficient notice; the notice only went out a day or two before, and they had not time to stop their cattle, and they complained much of it.

1467. Do you think that would not be done again?—Yes.

1468. It happened also at Keston, but you do not think that the prohibition would be evaded?—No.

1469. Not perhaps while they were in a state of panic, but afterwards would it not be evaded?—I would call every accumulation of cattle a market under those circumstances.

1470. Then you would go further, and prohibit any accumulation of cattle for sale?—Yes.

1471. Do you think that markets and accumulations of cattle for sale are the only ways in which this disease can be circulated?—There is no doubt that it has been so in Scotland in the first instance, and that the disease has infected all Forfarshire. There were several parties who bought cattle in Falkirk, and they brought them to Forfarshire, where infection extensively spread. A meeting of the justices and the lord lieutenant was held, and they prohibited all markets in the county. They could trace the disease step by step from Falkirk Market all the way from Dundee to Montrose.

1472. Do you think the markets are the only means by which the disease is communicated?—No; but they are a great cause.

1473. Do you not think that taking cattle into joist or into lairs may be one cause?—Quite so.

1474. Would you prohibit that?—I do not precisely understand the question.

1475. Suppose I have a farm, I take other cattle on to my farm to feed, and I am paid for that; the cattle remain there for two or three months; might they not bring the disease?—Yes.

1476. Would you prohibit that practice?—You could not well do that.

1477. Would you prohibit the lean cattle that come down from the Highlands from coming into England?—I would prohibit for a month all communication by cattle from one place to another.

1478. Not merely with respect to the markets, but you would prohibit all communication for a month?—Yes.

1479. Do you think that would be sufficient?—I think so, or perhaps for a longer period; but it might so seriously interfere with the business of the country that it might be objected to.

1480. It would be very serious, no doubt; but what is your view, on the other hand, of the danger that we should run?—If the inspectors do not do their duty properly, or if the Privy Council did not see that they do their duty, I think that the disease will spread much more extensively than it has hitherto done. At Chiselhurst there were several new cases last week, which is close to Lord Sydney's.

1481. (*Dr. Playfair.*) Do you think that the mere stoppage of the movement of cattle for a month would be effectual, unless great care was taken that all the manure of the diseased cattle was disinfected and all

the sheds well cleansed?—I do not; the one must accompany the other.

1482. There must, therefore, be very active hygienic measures taken in addition to the stoppage of the cattle?—Quite so.

1483. (*Chairman.*) You have expressed your opinion as to the origin of the disease in the county of Kent; have you formed any opinion as to the origin of it in England?—No; unless it be through infection or contagion.

1484. Do you believe that it has been communicated from abroad?—I have every reason to believe so, from all the accounts that I have heard of it, and from the disease being so specific.

1485. In Scotland has the disease been traced to its origin?—It has been traced latterly most distinctly from Falkirk Market.

1486. But beyond Falkirk where has it been traced to?—The first case was a calf that was bought in London, and was sent from King's Cross to Aberdeenshire; that was the first case of all, and that infected many cattle. This was a very recent case which occurred at Falkirk Market; it took place at the end of August or the beginning of September, and in every case it has been traced directly to the buying of cattle there.

1487. And you think it was taken to Falkirk from England?—Yes.

1488. (*Mr. Read.*) By what means?—By cattle being sent from England to be sold there.

1489. Do you believe in the spontaneous origin of the disease?—No.

1490. Where would be the harm in holding the great cattle markets of London, Liverpool, Bristol, and Edinburgh, if all the cattle were slaughtered on the spot?—The only objection I should have would be the danger of the transmission from the country to those great markets, they might communicate the disease on their passage.

1491. How would it be possible for the butchers in those large markets to buy cattle in the country?—It would certainly be a difficult matter, but they might do it, principally through the dead meat market. It would entail great inconvenience, no doubt, and cause great confusion to stop these markets for a month or so; but we are in such imminent danger of a national calamity, that in my opinion stringent measures must be taken.

1492. There would be no great hardship in stopping the local markets?—No, certainly not.

1493. (*Viscount Cranborne.*) Your fear as to the Metropolitan Market is, that the disease might be communicated by the cattle on their passage from a railway?—Yes, it might be so communicated as well as by the road.

1494. Are there any other means besides the railways for bringing cattle to the markets?—Yes, the steamboats.

1495. Are many cattle now driven along the roads and lanes to market?—Yes; I am told that there are a good many cattle from the Metropolitan Market which are driven past Chiselhurst, and they partly attribute to that the cases which occurred in Chiselhurst last week.

1496. Are the Welsh cattle sent great distances along the road in preference to sending them by railway?—Yes; they are good travellers; both the Highland and the Welsh cattle stand the road well, and they are often very little fatigued.

1497. What is about the greatest distance that they travel?—They are sent a hundred miles sometimes.

1498. (*Professor Spooner.*) You spoke of two heifers among Lord Sydney's cattle that were attacked but recovered?—Yes.

1499. Were those heifers treated in any way?—I believe not; they were not treated by me further than getting nourishing drinks; they were not treated by any veterinary surgeon or upon any scientific principles.

1500. Did you observe them after their supposed recovery?—Yes; I passed them out from a shed into a field as they recovered.

1501. Were they very much emaciated?—No; they were in excellent condition, and I attribute that to the circumstance that they were milder cases; one of them was pretty much diseased, but they were both milder cases than most of the others.

1502. Supposing those two cases had not been connected with the other cases which terminated fatally, would you have pronounced them cases of Rinderpest?—Yes, and especially one of them; the other did not show very marked symptoms.

1503. In that case you were led to consider it was this disease because it was in company with the others?—Yes, and I have not known any one instance in which one animal has escaped infection that was in communication with diseased animals.

1504. Has your experience led you to form any opinion as to whether the male or the female animal is more susceptible of this disease?—No. These were all young cattle of Lord Sydney's, two year old heifers.

1505. Which never had had the bull?—No; they were six quarters old. In Mr. Slade's case there were 25 cows and about 36 young stock, and all those young stock have died. There are eight of the 25 cows that have recovered to all appearance.

1506. Speaking generally as to the treatment which you may have prescribed, or which you have known others to prescribe, what is your opinion as to the disease?—We understand that the Privy Council sitting in Spring Gardens have discouraged inspectors entirely from——

1507. I mean what opinion have you formed as to the disease?—I was giving that as a reason why we have not made many experiments and trials. It is essentially a disease of the blood, and unless the blood is purified by a process of nature I do not believe that any medicine can reach it.

1508. (*Chairman.*) Will you state what college you belong to?—I belong to the Royal Veterinary College of London, and I am a member of the Board of Examiners of the Royal Veterinary College for the Scotch division.

1509. (*Dr. Playfair.*) Is there not a certificated body in Scotland besides the Board of Examiners of the Royal Veterinary College?—Yes, there is the Highland Society.

1510. (*Mr. Read.*) (*To Mr. Sharp.*) I gather from your evidence that Lord Sydney's park is divided into several fields; how are they separated?—By hedges, wire fences, and hurdles; some by hedges, some by iron fences, and some by wire fences.

1511. Of course in the case of the wire fences and hurdles the cattle have access to each other; they can come into actual contact?—Yes.

The witness withdrew.

Mr. George Tegg examined.

1512. (*Chairman.*) I believe you were appointed inspector of the markets by the Metropolitan Market Committee?—Yes.

1513. Are you a member of the Veterinary College?—I am.

1514. How long have you held your present appointment?—Nearly six years.

1515. When was it that the outbreak of the cattle disease first came under your notice?—On 6th August.

1516. Will you state what observations you first made?—I observed the symptoms that I had heard of, the peculiar character of the eye, the discharge from the nostrils, and the general appearance of the animal.

1517. You first detected its presence by the know-

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ledge you had obtained?—Yes; I had heard of it from Professor Simonds.

1518. Did you observe any cases in the market?—Yes, a great many.

1519. When did you first observe any case in the market?—The first case that I reported upon was on the 6th of August.

1520. Should you have observed any cases of Rinderpest in the market previously to that if there had been any?—I should, certainly.

1521. Do you think that the people there would have recognized cases of Rinderpest in the market until the case which you saw on the 6th of August?—I do.

1522. What course did you pursue when you discovered this case?—I had them immediately removed from the market and slaughtered; after which I made a post-mortem examination; the flesh was condemned, and the skins of the animals disinfected.

1523. What animals were they?—Cows; I know they were cows, because I remember that we had not a single beast affected in the market for a month or six weeks after it broke out.

1524. In the month of August hardly any bullock was seized with the disease?—I think I can safely say there was not one.

1525. How would you account for that?—I cannot account for it.

1526. To whom did those cows belong?—They came from different dairies in the immediate neighbourhood; they were all dairy cows.

1527. Were any steps taken to assist you in the inspection of the markets on your reporting that the Rinderpest had broken out?—Yes.

1528. What were those steps?—I reported the outbreak immediately to the Markets Committee, and they then wished to know what was best to be done. After consultation they advised that I should have men stationed at each gate leading to the market, and so we commenced on a Sunday night at 12 o'clock, at which time the market commences. I accordingly had men stationed at each gate, directing them to remain there until the market closed at 3 o'clock in the afternoon of Monday; I also gave instructions that they should take down the names and the addresses of the owners of every cow which came into the market, and of the persons to whom they were consigned; that is, the salesmen; also the number on the drover's badge, and his address; these lists being returned to me at the close of the day. I then had some lithographed letters sent out to each inspector in the several districts to inquire whether they had the disease in any of the sheds under their inspection; in addition to this I had two veterinary surgeons with me inside the market, my own slaughter-men, and slaughter-house.

1529. The persons whom you placed at the gates were not veterinary surgeons?—No.

1530. They were not able to detect and to stop any diseased animal that might be coming in?—They were good practical men who had been accustomed to cattle. My instructions to them were, that as soon as they saw anything in an animal that was suspicious, to have it placed on one side, and to send for me immediately. I have been in the market myself from 12 o'clock on Sunday night till 6 o'clock on Monday night.

1531. Were you able with your assistants to inspect all the animals in the market?—I believe we did inspect every one.

1532. What was the particular object of taking down the names of the owners of these cows?—It was a plan that I adopted because I was anxious to know whence they came; it was forbidden that all animals coming from diseased sheds should enter the market; although they might not actually have had the disease, it might still be incubated in the system.

1533. Had you any means of knowing in what sheds in the city there were diseased cows?—Yes, by writing to the veterinary inspectors of the different districts.

1534. Did you ever stop any cows that were coming into the market because you knew that they came from an infected cowshed?—Yes.

1535. Do you believe that the measures which you took were effectual in preventing the spread of the disorder?—I think they have gone a great way towards it. I think they are very good, as far as they go.

1536. Some additional measures have been recently taken with regard to cattle coming to the market only for the purposes of slaughter; how have they worked?—They have worked pretty well; but I would remark that we have no power to mark any animals that are not sold.

1537. Will you state what you do?—If I understand the Order in Council, it is, that all animals shall be sent to the market to be sold for immediate slaughtering as soon as they are sold. When sold, the cattle are marked as per order in the usual manner—that of clipping the hair off the tail.

1538. Take the case first of the animals that are sold, what proof have you that they are sold for slaughter only?—The aforesaid mark, it being only used upon cattle intended for slaughter, as it deteriorates the value of an animal for future sale to the amount of 2*l*.

1539. That would not prevent an animal from grazing?—No, it would not.

1540. You have no further proof that these animals are sold for slaughtering except the cutting of the tails?—I have not.

1541. Where do these animals after being sold go?—They go to different markets. I suppose there are from 300 to 400 that go to the Birmingham Market every Monday.

1542. Alive?—Yes; and some go to Chatham, Plymouth, Portsmouth, and various other places.

1543. Referring to those that go to Birmingham, are they exposed for sale alive in the market there?—Yes. I have every reason to believe that they are.

1544. With their tails cut?—With the usual mark.

1545. (*Mr. Read.*) What is the usual mark?—As above mentioned; but Government contractors have various other marks, such as an arrow, a ring cut round the tail, and others where the tails are square.

1546. The animals that are sent to Birmingham are not bought under a Government contract?—No.

1547. Although they have their tails cut they are exposed for sale alive in the Birmingham Market?—I believe they are.

1548. With regard to those which are not sold, what proof have you that they remain in London?—I have no proof whatever.

1549. Is there not every probability that they are returned to the districts from which they came to be slaughtered, or to be exposed for sale in other markets?—If the owners think fit to do so they can.

1550. Do you consider that the Order in Council works well with a view to preventing the spread of the disorder?—I cannot say that it does. It occurs to me that if all cows in London sheds could have some particular mark put upon them, we should know if London dairymen sent any to the market, and should not allow them admission, or, if admitted, they would be placed by themselves, and not allowed to go out alive.

1551. This refers entirely to the London dairy cows; but do you believe that any such system could be applied to other cattle that were sent to London?—I do not think it could.

1552. There would be no means of slaughtering them in London?—I do not think there is sufficient accommodation, and that it could not be done. I do not know what would be done with regard to the Government contracts. There is a large quantity of cattle going out for Government purposes.

1553. Do you think the animals might be slaughtered in London, and the meat sent to the places where it was required?—I think not; but if we could ensure their being killed as soon as they

got to their journey's end I think that that would be quite sufficient.

1554. You have spoken as to the home cattle; what do you say as to the foreign cattle?—The foreign cattle are particularly healthy, excepting a few of the Dutch animals. We have also a large number of Spanish beasts, and they are the finest and most healthy that ever came into the market.

1555. Have you had many diseased cattle from Holland?—Very few; I think not more than half a dozen.

1556. Do you remember the date when you first observed the disease among the Dutch cattle?—No; but I know it was a Dutch beast that came from Mr. Defries, who consigned it to his son to be sold.

1557. Have you any means of ascertaining the date when that occurred?—Yes, I can supply it.

1558. Does Mr. Defries often send cattle over to this country?—I believe he does. The father is over there, and the son is a salesman in the market.

1559. How do you think that the new Order in Council as to animals coming to the market only for the purposes of slaughter will affect the foreign cattle?—The foreign cattle all come to be slaughtered, except those that come for the Government contracts, and they are most of them foreign, and so are those that are sent to Birmingham.

1560. You do not believe that this order will prevent the importation of foreign cattle to any large extent?—No, it certainly will not prevent it. I do not see how it can affect them coming in at all.

1561. (*Dr. Playfair.*) Was the date when you saw one of Mr. Defries' cattle in a bad state on the 22d of June?—No.

1562. Was it later than that?—Yes; September 14th.

1563. Have you ever seen any disease among the Hungarian cattle?—I have not.

1564. (*Professor Spooner.*) Have any cattle that you have observed in the market affected with the disease been more particularly foreign or English cattle?—English, or Dutch cows that have been some time imported; I should think 99 out of 100.

1565. And principally cows?—Nearly all cows; in fact, I do not believe that I have sent out 20 beasts since the outbreak, but I have many hundred cows.

1566. When did you say that you saw the first case in the market?—August 6th.

1567. Was it a foreign or an English cow?—An English cow. I had not a foreign case for a very long time after the first outbreak.

1568. Are not a great number of foreign cows kept by London dairymen?—Yes; but when I say foreign cows, I do not mean freshly imported ones, but Dutch cows which have been in the country some time.

1569. Still they are foreign cattle?—Yes.

1570. I want to know whether from your experience you think that foreign cattle which have been for some time in this country are more prone to the disease than English cattle?—I do not. I do not think, from what I have seen, that I should be justified in saying to the contrary.

1571. Nor in drawing any distinction between the one and the other?—None whatever.

1572. To what do you attribute the fact of the disease being principally confined to the cows in the metropolis; or are they most prone to it?—I think it must be from the manner in which the cows are kept in close, ill-ventilated places; not that they are more prone to it.

1573. Oxen are not kept in London?—No, or only for a few days at the most.

1574. You have had no evidence of the disease existing in the country districts at all?—I have, in my own neighbourhood. I can mention a case that happened on the estate of Mr. Samuel Morley, M.P. I was called in to see the case the other day, which was a very clear one, there not having been a cow outside the premises since the first week in June; none of them had been in sheds; they were all in paddocks, and had never been within 500 yards of the high road.

1575. A case broke out there?—Yes, and they lost three cows and two calves.

1576. Are the Commissioners to infer from that that it is your opinion that the disease is propagated in this country?—Yes.

1577. It arises here, and it is not an imported malady?—I do not think it is.

1578. Do you believe in its infectious character?—I do.

1579. Do you think it is highly infectious?—I think it is.

1580. Can you name any particular locality or place where you think the disease was first originated in this country?—I have reason to believe that it originated at Islington. My district (Hackney) is very bad; I should suppose there is not a worse anywhere, there being scarcely a shed that has escaped the disease.

1581. Do you suppose that the disease originated in one particular cowshed, and then spread itself by infection to all the others in the metropolis, or that it broke out simultaneously?—I think in the latter way.

1582. That is your conviction?—Yes.

1583. Have not the cowsheds of the metropolis of late years undergone important improvements in the general sanitary arrangement of them?—They have; but still I think there is room for much greater improvement.

1584. Can you mention to the Commission any causes which have presented themselves to your mind as being calculated to account for this disease having occurred this year, and not in antecedent years?—I cannot.

1585. I am to infer that you consider the sanitary condition of the metropolitan markets and the London cattle sheds is quite equal now to what it has been for many years past?—It is decidedly improved.

1586. Have you any reason to suggest why this special disease should have been engendered among our cattle this year?—I have not, not the slightest. I do not know whether I ought to have mentioned the manner in which the market is cleansed, but it is washed down every week thoroughly, and disinfected.

1587. But that has taken place, as I understand you, since the outbreak of the disease?—Yes.

1588. (*Dr. Quain.*) Referring to Mr. Morley's cows, is it your impression that the disease was generated among them under the most favourable circumstances in which cattle could be placed?—There is not the least doubt of it; it is a most delightful place, surrounded by trees, and the cattle were not within 500 yards of the high road.

1589. (*Mr. Read.*) You think that in that case it broke out spontaneously with the best management, and you think that it broke out in the dairies under bad management?—Yes; I think that it broke out spontaneously.

1590. Is it a new disease to you?—Unquestionably.

1591. You never saw it before?—Never.

1592. I think you stated that the first case you saw was on about the 31st of July?—It was on the 6th of August.

1593. When did your more rigid inspection commence?—It commenced immediately after the outbreak.

1594. Do you know Mr. Priestman, the inspector of Islington parish?—Yes, I do.

1595. It has been stated in evidence that on the 10th of July there were 200 diseased cows in the Metropolitan Market; do you think that that was the fact?—No, certainly not.

1596. You have stated that none but cows were affected with the disease?—Not for a very long time.

1597. Do you mean heifers and cows?—Yes.

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1598. Do you include among cows heifers that have not been milked ?—Yes ; but I think I should not include them at the commencement ; they were milch cows.

1599. Do you remember that on Monday the 7th of August you seized a good many cattle ?—I know that I made some heavy seizures several times ; we had 40 odd from a person of the name of Hatt.

1600. Do you remember on that day seizing and condemning four Welsh grazing heifers ?—Yes; they were trucked in from the railway.

1601. Do you happen to remember on that day seizing a Dutch cow, and killing it in my presence in a shed ?—We had a Dutch cow. Was it a fresh imported one ?

1602. It was a Dutch cow.—I asked the question because if it had been a fresh imported one I should remember it.

1603. You do not remember the case of the four Welsh heifers that you condemned ?—Yes.

1604. Nor the carcase of a bullock or steer that was thrown outside the slaughter-house, and covered over with creosote ?—No ; if I had my report book here I could give you the necessary information.

1605. You have stated that you had none but cows affected with the disease ; but on the day to which I refer there were four Welsh heifers, and the carcase of a steer outside which was done over with creosote ?—I could clear the matter up by reference to my report book ; but sometimes we have cases of oxen, foreign beasts, where they have been kept so long without water that when they come here they drink a large quantity, and inflammation of the bowels comes on, and they die ; they are in a frightful state ; we are obliged to condemn them ; but if any animal had died with the Cattle Plague I could give you the information after referring to my report book.

1606. I observed that the market this morning was wonderfully clean ?—Yes, particularly so.

1607. Is it always as clean as that ; I refer particularly to the cleanliness of the stones ?—It is washed down every week, and we have lately had some heavy rains, but it has been quite as clean as that for months.

1608. What was the sort of inspection that was made with regard to the 6,000 bullocks before the present stir was made ?—I had the whole management of the 6,000 or 7,000 beasts, and between 30,000 and 40,000 sheep, besides pigs and calves, and all the slaughter-houses, without any assistants.

1609. Could you give that large numoer of animals any kind of minute inspection ?—I did the best I could.

1610. Were not a large number of the sheep that were sold this morning in the market store sheep to go into the provinces ?—No doubt of it.

1611. Is there any reason why a grazier should not go into the market now and buy any quantity of store stock that he liked, and take them away ?—There is no prohibition.

1612. And anyone so inclined could do it, might he not ?—Yes.

1613. (*Viscount Cranborne.*) You have spoken of having made several heavy seizures ; do the persons from whom you seize offer many protests, and assert that the cattle are seized without sufficient reason ?—Very, very seldom.

1614. Why ?—Because my instructions are to prosecute in any case where we find them.

1615. Are you to prosecute any one who brings a diseased cow to the market ?—Yes, or for bringing any cow out of a diseased shed.

1616. I presume you only seize in cases where the disease is very distinctly seen ?—If there be the slightest suspicion connected with them I have them immediately removed out of the market, and all the animals that have come with that lot ; they are taken to the slaughter-house, and examined after death.

1617. What becomes of their bodies ?—We pass them if they are good for human food.

1618. Are they restored to their owners ?—Yes ; they have everything except the skins, which are disinfected.

1619. You never have any protests made ?—I can remember but one only.

1620. What, practically speaking, are the objections to having the whole of the cattle that are brought to the London market slaughtered there ?—The expense is one thing, because those who have their own slaughtering houses do not like to pay about 4*s.* each for killing them at the market ; I do not know that they have any other objection.

1621. You see no other objection to such a practice than the expense it would impose upon the owners of the animals ?—No ; there is no objection to their being slaughtered in the market, and the meat is worth a halfpenny or a penny a pound more.

1622. Why is that ?—In the first place they are not driven a long distance, and these slaughter-houses are so beautifully ventilated.

1623. If the accommodation is not sufficient at present, would it take very long to erect temporary slaughter-houses ?—Not very long, I should think.

1624. (*Chairman.*) How are these slaughter-houses regulated ; do they belong to the Corporation of London ?—Yes, and they are let to tenants.

1625. Do you know how many there are ?—Seven.

1626. Are yards attached to them for the cattle that are driven there ?—Yes, each of them has a pound.

1627. How many cattle will it contain ?—Twenty to thirty. They also have a large paddock in front and behind them.

1628. And how many would the paddocks contain? —Several hundreds.

1629. Can you state the number a little more precisely ?—I should say that they could accommodate for a short time 800 to 1,000.

1630. Can you state how many cattle the lairs and slaughter-houses would accommodate ?—The lairs would accommodate I think about 3,000 beasts.

1631. And the slaughter-houses an equal number ? —They would take a few, say 20 or 30 to each.

1632. I understood you to say that there were paddocks also ?—Yes. The market stands upon 75 acres, but the market proper occupies only 14, and you may judge how much is left.

1633. Do those paddocks belong to the owners of the lairs or to the corporation of London ?—They belong to the corporation. There is lairage room for 3,000 ; but there is room in the market area to build lairs to accommodate five times that number.

1634. You stated in answer to Lord Cranborne that when you find any infected animals you send them to the slaughter-house, and that both the infected animals were slaughtered and the animals in company with them. Is that the case ?—Yes.

1635. What becomes of the meat of the animals that are not infected with the disease ?—That is passed for human food.

1636. Under any guarantee that the meat is wholesome ?—It is quite sufficient guarantee that they are allowed to take it away, for everything is examined before it goes.

1637. But how can you know which is the meat belonging to an infected animal and which is the meat belonging to an animal not infected ? —I place a mark upon the animal, and the skin is not detached until after I have examined it.

1638. (*Professor Spooner.*) Under what circumstances does that take place ?—In all cases of diseased animals.

1639. (*Chairman.*) What becomes of the meat of the diseased animals ?—It is destroyed and disinfected, after which sent to the boiling-house and boiled.

1640. How is it destroyed ? — By creosote and chloride of lime.

1641. The wholesome meat is given to the owner, and he then takes it to the market, and sells it ?—Yes, in the usual way.

1642. (*Viscount Cranborne.*) I suppose that the

meat of an animal slightly infected is wholesome?—Yes, I believe so.

1643. (*Chairman.*) Is the practice of burying the carcases of diseased animals carried out in the city?—Not in the city.

1644. But it should be, according to the Order in Council, should it not?—Where it is practicable it is done, but it is impossible to do it in many places.

1645. Is it impracticable in the city?—Quite so.

1646. There is no open space in which to bury them?—No.

1647. Do you consider that the mode of disposing of them which you have described is as effectual as burying them?—I think quite so.

1648. The hides I understand are not destroyed; they are only disinfected?—Only disinfected.

1649. (*Mr. Read.*) How are they disinfected?—By chloride of lime and other disinfectants.

1650. (*Chairman.*) Is the drainage from the slaughter-houses disinfected?—Yes. The Markets Committee have taken upon themselves to remove all the manure and the refuse from the slaughter-houses; it is all placed in a heap, and thoroughly disinfected. To every layer of manure, there is a layer of chloride of lime.

1651. (*Dr. Playfair.*) You have not sold any of that yet, have you?—No, not any.

1652. (*Mr. Read.*) There is a very large heap of it, is there not?—Very large indeed.

1653. What was the general state of the health of the cattle this morning?—They were particularly healthy; a very marked improvement has taken place in them, and I think that that has been in consequence of taking down the names of the owners at the gates; it seems to have had a very beneficial effect, for they seem to be very timid indeed now about sending in their cows. I only made one seizure during the whole of last week.

1654. Have you made any seizures to day?—None.

1655. Have you not observed that the foot and mouth disease has become very general?—We do occasionally see it.

1656. Not only occasionally, but generally, this morning?—Yes, it has been so.

1657. Should you not say that at least half the cattle in the market this morning exhibited symptoms of the foot and mouth disease?—No; but there were a great many.

1658. Of course foreign cattle are as liable to have that disease as English cattle?—Yes, quite so; but we do not attach much importance to it, as it does not affect the meat in any way.

1659. I think you would say that the foot and mouth disease is more prevalent now than it was a few months ago?—Yes, it is. It disappears altogether for a few months in the year, and comes on again in the spring and autumn, when it mostly prevails for a month or two, after which it will disappear.

1660. Is pleuro-pneumonia prevalent?—There is very little indeed of it.

1661. In the cases of pleuro-pneumonia which you have seen, were they mostly cows that were affected?—I think I may say that they were almost invariably cows from the cowsheds.

1662. In fact the chief amount of disease of one sort and another you would trace to the London cows?—No question about it; 19 out of every 20.

1663. I mean previously to the recent outbreak?—Yes; speaking of the lung disease, certainly quite as large a per-centage as I have given.

1664. (*Dr. Quain.*) With regard to preventing diseased animals from entering the market in the very earliest stages of the disease. Are there any symptoms by which you can judge, or could you say that the disease was or was not present in its very early stage?—It would require a person to be very cautious in his examinations then.

1665. The men who watch the cattle enter the market are not competent to judge as to whether they are in an early stage of the disease or not, are they?—They are men possessed of a considerable knowledge of cattle. Should they see any animal which gives the least cause for suspicion, their instructions are to place them aside for my inspection. I have also the assistance of two veterinary surgeons, who with me examine every beast in the market.

1666. You think it is impossible that diseased cattle could be sold now in the market?—Yes, with the attendants that we have.

1667. With regard to the disinfecting process, who superintends that?—I do.

1668. I mean the disinfection at the slaughter-houses of the hides and horns?—Myself. There is very little of that done now. I do not think we have had more than two or three cases in the last fortnight.

1669. Take the hides and the horns, how would they be disinfected; what is the process?—It is done by chloride of lime.

1670. Do you steep them in it, or is it done by sprinkling?—By sprinkling.

1671. Is that sufficient?—Yes; they are first sprinkled, and then drawn along the floor, which is previously covered with chloride of lime.

1672. On both sides?—Yes.

1673. Is that done in every case?—Yes.

1674. (*Dr. Playfair.*) Is it dry chloride of lime that is used?—It is dry; the skin itself is moist, and absorbs a large quantity.

1675. (*Professor Spooner.*) I think I understood you to say that the disease is seldom met with now as compared with three or four weeks ago?—We are particularly clear now. I have had a great number there in a day, but we have not had more than one for the last week.

1676. To what do you attribute this change?—A great deal of it is the result of taking down the names, and also from persons not being allowed to send animals out of diseased sheds without the certificate of the Government inspector, and there are not nearly so many to send, for the cattle sheds are nearly empty. I can mention many cases, in one of which there were 150 cows, where only six survived; another had 115, and lost all. I believe that there are scores of sheds where they have not one left.

1677. Have you attended many cases with a view to the cure of the disease?—Yes, a few. I attended Mr. Morley's. I also had some cases on the opposite side of the way. Three gentlemen living on Stamford Hill had all their cows taken with the disease, in consequence of a cowkeeper, who had 150 cows, leaving a dead cow in his field unburied for two or three days, and these gentlemen, whose fields adjoined, had all their cows infected. I saved one out of three.

1678. Have you had opportunities of observing the disease in all its phases, and the symptoms of it?—Yes, I have.

1679. And the post mortem appearances?—Yes.

1680. Have you any reason to believe that any change has taken place, since the first outbreak, in the general symptoms of the disease?—I have. I do not think it is so virulent now as it was; I believe it assumes a milder form.

1681. Do you believe that the animals which become affected by it live longer than they did?—Yes; I am satisfied of that.

1682. Are you of opinion that in more cases animals recover now than on the first outbreak of the disease?—I am satisfied of that.

1683. Do you feel sure of it?—I am sure of it. We have had several cases in our immediate neighbourhood where animals have recovered lately; but I think that the Dutch cows get over it more easily than the others.

1684. That is your impression from the observations you have made?—Yes, and has been for some time.

1685. You mean that Dutch cows which have been previously kept in England for some time, and

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then become the subjects of the disease, are more likely to recover than English cows ?—Yes.

1686. Have you seen many cases of recovery ?—I have seen several.

1687. As many as 20 or 30 ?—Yes ; 50.

1688. Cases of recovery ?—Yes.

1689. Have you found that the condition of those animals which so recovered was very materially affected so as to require a long time before they could again get up their condition ?—No ; I do not think so.

1690. They have not not become very materially emaciated ?—No ; I do not think so.

The witness withdrew.

Adjourned till to-morrow at 12 o'clock.

Friday, 13th October 1865.

PRESENT :

Earl Spencer.	Dr. Parkes.
Viscount Cranborne.	Mr. M'Clean.
Mr. Lowe.	Mr. Wormald.
Dr. Lyon Playfair.	Mr. Ceely.
Mr. Read.	Professor Spooner
Dr. Bence Jones.	

EARL SPENCER IN THE CHAIR.

Mr. J. Giblett.
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Mr. John Giblett examined.

1691. (*Chairman.*) You are I believe engaged in the cattle trade ?—Yes ; and I have been so for the last 30 or 35 years.

1692. Will you describe what your business generally is ?—Merely selling cattle in the Metropolitan Market. I never have any of my own except from private grazing. I sell cattle on commission as a broker (of the firm of Giblett and Son) in the market. I have often sold above 300 a week for many years together.

1693. Cattle are consigned to you from different parts of the country by the farmers ?—Yes, through all parts of England, Scotland, and Ireland, and from most parts of the Continent.

1694. With respect to the home trade, have you direct communication with the owners of the cattle, or is there any middleman who comes between you and them ?—There is no middleman, except those who buy cattle ; then there are the owners. We generally have letters sent to us of the consignments, and our men are always at the termini to receive the cattle. We immediately remit the money, and it is paid the same day or the next morning ; and a great many large transactions take place in which we never see the owners at all.

1695. With regard to the foreign trade, are you in communication with foreign dealers ?—To a very considerable extent.

1696. With regard to the Cattle Plague which has broken out ; when was it first brought to your notice? —The first and most serious case which came to my notice was that of Mrs. Nichols in Liverpool Road, Islington, who lost I believe 105 cows. When I say "lost," there are a great many cowkeepers who say that large numbers of their cows have been swept away, but several having died they send the rest away as quickly as they can, therefore they are not entirely lost.

1697. Do you know the particulars of that case ? No, I do not. I have my own views upon the case.

1698. Will you state what your views are ?—Some time since I wrote a letter on the subject, published in the Times, and I have no reason to alter the views contained in that letter. I have had a hundred communications approving of that letter. I believe that there has been a baneful atmospheric influence. I do not at all believe in the reiterated statements of a few persons that it is an imported disease ; on the contrary, I know that we have had diseases among cattle for a great number of years past ; we have had the lung complaint ; we have had what is termed the foot and mouth complaint, but in my humble view of the case the foot and mouth complaint is no complaint in itself ; it is the result of a complaint in the animal ; that is my conclusion from my experience upon the subject ; the foot and mouth complaint is merely the result of a fever in the animal. In a hide-bound animal having fever it cannot escape except through the hoof, or through the mouth and tongue. 25 years ago I saw 80 animals in a day killed in Smithfield Market from the foot and mouth complaint.

1699. Then is it your opinion that this Rinderpest has been in existence for some time in England ?—I believe that the extreme heat of the weather this summer has made the diseases to which cattle have been long subject a great deal more virulent.

1700. Do you believe that the seeds of this disease have been in existence for some time in England, previous to the month of June ?—Certainly I do ; I see vegetation affected to a serious extent ; potatoes and turnips, and even the hedges affected. When the easterly winds prevail I know that that which we call the foot and mouth complaint is generally much worse, which is a proof that it is atmospherical. Neither do I believe in the statements which have been reiterated as regards the disease coming by a cargo of animals from Revel. It is astonishing to see the quantity of foreign stock which now comes. Last week I sold about 500, and only 35 English, although I am reputed to sell as many good English oxen as any person in the trade.

1701. Do you believe that there have been many instances in which foreign cattle have been disposed of in the market which have been suffering from this disease ?—I do not know of one ; I have never had one of mine retarded in any way.

1702. Will you state from what countries of Europe the foreign cattle come ?—I have sold for many years past from 2,000 to 3,000 oxen a year from Oporto. I never saw one of those diseased, except that after they had been in this country for some time they might have had the foot and mouth complaint.

1703. I suppose that these are Spanish and Portuguese cattle ; where do they land in England ?—Most of them land at the Dublin Wharf.

1704. In London ?—Yes ; some of them used to come to Southampton, according to the direction of the owners.

1705. What are the other countries from which you receive foreign cattle ?—I am canstantly receiving now from Oporto and from Spain ; a large quantity come through Corunna. For many years I have had a continuous quantity from Tonning.

1706. Can you state the numbers which you have received from Tonning ?—For the last 20 years about 100 a week during the time of their importation ?—

1707. To what country do the animals belong ?—

They are what we term Jutland beasts; they come from Jutland, and they are fed in Schleswig-Holstein.

1708. Do you get many Dutch cattle?—Personally I sell very few Dutch cattle.

1709. But a considerable number come from Holland?—A great many, and Dutch sheep, in immense numbers.

1710. Do you get a large number of Hungarian cattle?—Occasionally. I had some in market last Monday; they are mostly a grey kind of cattle.

1711. How do they come; what route do they follow?—They chiefly came from Hamburg.

1712. (*Dr. Playfair.*) How do they go to Hamburg?—I do not know.

1713. (*Chairman.*) Are you acquainted with the regulations in foreign countries with regard to the movement of cattle, whether there is any system of inspection?—Yes; I belong to an association, and we constantly have intelligence of all the cattle being inspected before they are sent from abroad, and I have personally great faith in the gentleman whom the Government has appointed to inspect the cattle at the wharves here, Mr. Simonds, and Mr. Holman, another gentleman with him.

1714. I am speaking more especially with regard to the inspection abroad before the cattle leave the foreign ports; do you believe that that is sufficient?—It appears so when out of the many thousands which come we hardly find any affected.

1715. Have you heard of any cases of beasts which have been stopped abroad in consequence of these inspections?—No; my experience has been chiefly confined to my trade at home.

1716. With regard to the home trade, do nearly all the cattle which come to you come by railroad, or are any driven by the road?—The majority come by the railway, and some by steam from Scotland. I sell a large quantity of good Scotch cattle, and have done so for many years.

1717. Has the presence of this disorder very much checked the home trade in cattle?—It has checked the feeding, and it has caused a great many to be sent away through fear in a lean state; there has been an immense loss of cattle sent away from the apprehension of the parties to whom they belonged; there has been an immense quantity of cattle sent away unfit to be killed, at a serious loss. Devon beasts, which made about 13*l.* or 14*l.* apiece, would, if they had had an opportunity of being fed, have been worth 24*l.*

1718. Do you allude to the regulation now in force in the market, that cattle should only be sent up for the purpose of slaughter?—No. I am more particularly alluding to the fear and apprehension of graziers in many cases which has caused them to send cattle away. I also think that a great many are condemned to be killed which are good. In nine cases out of ten when they are condemned they are pronounced to be wholesome, and the meat is afterwards eaten.

1719. Do a great number of graziers, where the disease has broken out, now send up for slaughter animals which they otherwise would keep for grazing?—Yes, a great many. If the disease has broken out in a district the neighbours become alarmed, and they send off their cattle, which are sold at very inferior prices. Our London Market is a transit market to a great extent. More than one third of all the quantities that come throughout the year go into the country again; quite two thirds of all the best beasts, the high-priced beasts, which I sell, go some considerable distance out of town, into the country.

1720. Do you allude now to fat animals, or those sent for stock?—None are sent to our market for stock.

1721. Then I understand that a fat beast is sent up from the country to London, and is bought there, and sold again to another butcher?—Yes; the London Market supplies every town round the coast. Nearly 1000 beasts a week go into Kent, and at this time of the year we supply with meat all the towns from Brighton right round the coast from the London Market.

1722. Do you not believe that that is a means of communicating the cattle disorder to different parts parts of the country?—It may be a means of doing so. If the cattle here were affected, of course it would be a means of doing so; but I do not believe that it is the means by which the disease is generally spread. Yesterday I sold some cattle, as I do every week, to go to Yorkshire, to Wakefield, and large quantities to Birmingham. A gentleman stated that he is determined not to buy any English cattle at all, there being so much danger about them. He has bought some which have died, and he comes here to buy those cattle which he knows are sound, and they are invariably foreign stock, and sometimes there are 150 a week which go to Birmingham and to Wolverhampton from our London Markets, and to Wakefield, and in fact round the country, and now that the fairs are annihilated it brings a greater number of butchers to the London Market.

1723. What is your opinion of the last Order in Council, which prohibits animals from coming to London, except for the purposes of slaughter?—It had at first a very serious effect upon our trade; prices were considerably reduced at first. My opinion was asked upon the subject, and I was averse to such a law being made. Although the tails of the animals are cut, which is the usual mark which we have of their being sold, yet that does not prevent their being sold again in the country. These markets and fairs in different districts having been abolished by the municipal authorities in different places, it causes men to come up here to buy larger quantities. For instance, these jobbing men very often supply to the smaller butchers their meat; they are dependent upon the men who go from their homes to the London market to buy the cattle.

1724. Then you are opposed to the measure, and you do not think that it has had the effect which the Government expected?—It certainly would not have the effect of stopping cattle from being bought in the London market, for the sake of supplying the country, because it is an absolute necessity. In many working districts, and in all these large towns, it seems now to be the habit of the people to have the meat; it becomes a matter of necessity, and the dealers could not supply them in their different localities, if they did not come to London for it; there is not enough for the purpose without it; there are only a few counties which feed enough for their own supply, such as Norfolk, during a particular time of the year, and Ireland and Scotland. There are other counties which do not feed one twentieth part sufficient for the people.

1725. Then you are opposed to the closing of all fairs and markets in the country?—I think that while cattle are affected round about, it is a very desirable arrangement to close the fairs, especially for store cattle. All our cattle which are sent to the London market are intended to be killed, and although they go into the country they are generally killed within a week, because it would not answer the purpose to keep them alive; they sink fast.

1726. Is there not now a considerable trade in meat alone, the animals being slaughtered in the country?—Yes; and it will be an increasing trade. From Scotland a great many more come dead than alive; sometimes there are 300 a week alive, and I should think 600 oxen a week dead from Scotland alone. That is in the cold weather, when the weather permits it; but there are times of the year when the weather will not render it practicable for them to kill the animals in the country and send them up great distances.

1727. In winter do you think that it would be practicable to confine the butchers' trade in the country to meat alone, and to prevent all movement of live cattle?—It would be fearfully arbitrary; it would be contrary to a free constitution.

1728. Would it be practicable?—It would be

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practicable, but I do not see the benefit of it; it would be practicable, under certain difficulties; it would be seriously injurious to the trade in general.

1729. What would be your means of putting an end to the disorder in the country; have you any suggestion to make as to checking it?—I think that there are very excellent arrangements as regards the stopping of fairs for the sale of lean stock, but I am apprehensive that although that may be a good thing it will have a serious effect upon the supply, and I think that we should be very grateful that we can get a supply from abroad. The fact is that our own supply is diminishing, and our demand is, without doubt, increasing. Some of our beasts in England are very diminutive, compared with what they are abroad. There is now a new trade opened from France. I have sold 1,000 oxen within the last five or six weeks from Normandy, and those 1,000 oxen have averaged about 25*l.* apiece. It will be an immense trade eventually. They get the best breed; they get the short-horned blood; they get as good blood as we do, and better keep. I have at this time of the year sold some animals at 35*l.* 10*s.* from France, and last Monday I sold some at 30 guineas each, as fine animals as I ever saw in my life, both dead and alive.

1730. Any regulation stopping all movement in your trade would in your opinion greatly affect your import trade?—It would be lamentable. I cannot imagine the propriety of its being thought of; it would stop the people from being fed.

1731. It would not be desirable to have the animals slaughtered at the ports where they were landed, or to have them sent over dead from France or countries near?—No. They are very strict as regards the foot and mouth complaint, and have been so for many years as respects the cattle landed here, and I have known whole cargoes which have had to be killed at the wharves at the loss of 3*l.* a head. When the foot and mouth complaint became general the Government inspectors, I presume acting under orders, were very strict indeed, and when one or two oxen have come with the foot and mouth complaint I have known a whole cargo of 200 oxen stopped, at a loss of 3*l.* a head in consequence; they have been killed, and thrown into the market when they were not wanted.

1732. (*Mr. Lowe.*) Am I to understand you to say that you have seen this Rinderpest or Cattle Plague in England before this summer?—No.

1733. Then upon what do you found the opinion that it has existed in England before this summer?—I do not know that it is the Rinderpest.

1734. What do you think it is?—I think that cattle have been subject to serious illnesses prior to this year. I can take the case of Mr. Thomas Duckworth, a highly respectable man; I believe that he, three years ago, bought 20 oxen at 21*l.* 10*s.* a piece, and 10 of them died.

1735. What did they die of?—It was generally thought to be the lung complaint.

1736. That has been in existence for several years?—Yes.

1737. Then do you identify this present disease which is raging among cattle with pleuro-pneumonia?—No.

1738. Why do you think that this same disease has been present in England before?—I did not say this same disease. I mean that disease has been very prevalent, and this may be a worse feature of the diseases which we have had in a milder form for some years.

1739. Are you acquainted with the medical peculiarities of this disease?—I am aware of all the symptoms of it externally, but I have not attended any anatomical dissections.

1740. Have you ever known a disease in this country before with exactly similar symptoms?—Externally I have observed the same symptoms.

1741. As indicating what disease?—The disease which has been so general, particularly the foot and mouth complaint and lung complaint; the animals have running at the eyes, and also shortness of breath, and many of those symptoms, such as shivering and cold.

1742. Do you believe that this disease is only an aggravation of the foot and mouth complaint?—I believe it is fever in the animal from atmospherical causes, and that it has been aggravated by the extreme heat of the weather, and become more virulent.

1743. Do you believe that the London market has had anything to do with spreading the disease over the country?—As regards the cows out of the sheds, I believe that it is probable that they have had to do with it.

1744. You think that they have been sold in the market, and taken to different parts of the country, and that they have generated the disease there?—I think that is probable.

1745. Do you propose any remedy for that?—The majority of the cows are extinct.

1746. But other animals are sold there under similar conditions?—If they have any symptoms of disease about them they are not allowed to leave the market to go into the country; they are examined again.

1747. What is done to prevent their leaving?—The inspectors are all very vigilant in their inspection of them, and they are not allowed to go into the country.

1748. Supposing that an animal has the disease latent in him, and not developed, the inspector cannot find it out, and may not such an animal be sent into the country with the disease?—Certainly.

1749. Can you suggest any remedy for that?—There are hardly any dairy cows bought now to go into the country; the matter has almost cured itself. Inasmuch as the cows have been reported to be bad, they are scarcely allowed, I think, to go into the country; hardly any person buys town's end cows for that purpose. Persons buy the foreign stock because they know that the foreign stock are sound.

1750. Supposing that any one sends an animal into the market which infects other animals, how can that be prevented?—If it is in an incipient state it can hardly be prevented.

1751. Are you of opinion that the country markets should be closed?—I confine myself to the fairs where live stock are congregated together. In those localities where the disease has been known to be prevalent among live stock I think it very desirable that the fairs should be prohibited.

1752. But not the markets?—Certainly not. As regards the markets, where the butchers come from 10 or 20 miles round, I do not see the necessity or importance of their being stopped.

1753. And you would not stop the London market, though it has been the means of disseminating the disease through the country?—The result of stopping the London market would be so serious that the public would have it altered very shortly.

1754. How would it be so baneful?—Because in different localities they could not get the meat.

1755. Why not? Would it not be possible to get meat except in the shape of live animals?—It is possible, but not very practicable, as a general practice.

1756. Why not?—It would be attended with serious expenses.

1757. One effect, I suppose, is, that it would raise the price of meat?—Very seriously indeed.

1758. How do you suppose that we are to get rid of this disease, which we have now, according to the plan which you propose?—Believing it to arise from a baneful atmospheric influence, I have the full hope of the cold weather causing it to disappear.

1759. If the cold weather does not happen to do that for us, what then?—It is our duty to take every step in our power.

1760. What step?—Stopping the country fairs is one step, but not the country markets. I do not see the benefit of that.

1761. Do you think that if the atmosphere does

not take compassion upon us, and allay the disease for us, stopping the country markets will do all for us?—I think that the cold weather will do much to annihilate the disease.

1762. Suppose that it does not?—It is a dispensation of Providence.

1763. And you must let Providence have its way?—We have not had much assistance in the matter from the medical profession, certainly. We naturally look to them for help. It is hardly to be expected that we can suggest any means. I will observe that on a late occasion which came before Parliament with regard to the foot and mouth complaint, it was the opinion of Professor Simonds that it was entirely an atmospherical influence. This is a letter which it was my duty as chairman of our trade to send to each of the Members of Parliament, in which there is the following sentence:—"The Committee further desires "to impress upon you that the character of the "'foot and mouth complaint' shows that it should "not be legislated for as a purely contagious disease, "it being an established fact that animals which "leave the premises of their respective owners in a "state of perfect health are often affected by this "epidemic before they reach their destination, and "this solely from an atmospherical influence." That was the opinion of Professor Simonds. He was at the meeting, and coincided in the propriety of that step being taken, and that clause being inserted. If it was an atmospherical influence, then this particular disease may be upon the wings of the atmosphere now. If it is an atmospherical effect we cannot stop it. The best way is to cure it if we can. It appears to be spontaneous in Wales. We have a great many beasts sent up from Wales. It appears to be spontaneous in many cases where there have been no foreign stock at all.

1764. (*Dr. Playfair.*) I did not quite understand what you said with regard to about one third of the total cattle in your market going down to the provinces?—Certainly quite one third or more than one third of the whole supply coming to our cattle market is not sold for London consumption. It goes out of London; there are the suburbs of London, there is 20 miles round, and there are all the towns and cities.

1765. Is not the number of cattle sold in your market about 350,000; was it not 339,000 last year?—Yes, I think so. It is about 7,000 or 8,000 per week.

1766. Taking the number last year, 113,000 head of cattle, or fully one third, would go out of London in a live state for the provinces?—Yes; 99 out of 100 leave the market in a live state.

1767. But they are killed in London?—Yes, and in the suburbs of London, and the towns to which they go. There are so many difficulties connected with the abattoir system, and killing them near the market, and there is such danger of the parties not having the internal part of the animals, the fat and so on, that they do not like to trust that matter in the hands of other men; it entails upon them the necessity of so many men to look after it.

1768. (*Mr. Wormald.*) Did you not state that you believed that the hide-bound condition of the animal always preceded the foot and mouth disease?—No; I said that I did not believe that the complaint of the foot and mouth was a disease at all; that I thought that it was the effect of a disease; that the fever in the animal, being hide bound, could only escape through the foot or mouth. I am speaking of the hide which is over the animal. I am not speaking of its being hide bound in a feverish way.

1769. I understood you to say so?—No. If the animal has fever in itself how can it escape except through the mouth or the feet.

1770. When an animal has fever is it hide bound?—All inflammation would tend to make it so.

1771. (*Mr. Read.*) Do you consider that the London dairies are generally seats of disease?—I do; and I think that they have been seats of disease for a great many years past. If I were to give a hasty opinion I should certainly say that two out of three animals which have been in the cowsheds for many years past are not sound. I should say that certainly half of the whole number of animals are not sound, and are subject to disease, from the number of cows which we have seen in a diseased state.

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1772. Are the dairies now better or worse managed than they were some years ago?—I have no doubt that some are a great deal better managed, but as we pass a lot of grains they sometimes smell very bad; and they are very often kept for three weeks together. I think that that is calculated to engender diseases, or if not to engender them to make them worse from the way in which the animals are fed. Mr. James Rhodes thirty years ago had all his cow sheds cleared out by the general disease. We have had diseases many years ago quite as rampant and fatal, and a great deal more than what at the present time is called the Cattle Plague. I am anxious to state my opinion that I do not believe in this disease being imported. I would write more upon the subject, except that it might be looked upon as being suspicious, because I am extensively connected with the trade, and it might be supposed that I expressed my opinions for my own interest; but I am not particularly interested about a very extended business, for I have as much or more than I care for or wish.

1773. I gather from your evidence that you believe that this disease has been of spontaneous origin in the London dairies?—Yes; I have no other conclusion which I can come to; and not only in the London dairies, but I believe that it is spontaneous in many places. I believe in atmospheric influence, and that the disease, if not positively engendered by the London dairies, yet that fever of all kinds is bred and sustained in those localities which are badly drained and badly ventilated, such as we find our London dairies are. I do not wish to state that it has been engendered in the London dairies, but I believe that it is in the atmosphere, and that there is a kind of cholera in the air, which is a precursor of cholera in cities.

1774. You have said that we had worse diseases in the London dairies 30 years ago than we now have?—Yes; we had diseases then which swept certain dairies.

1775. Can you give us any evidence whatever to prove that those diseases spread into the country in the way that this Cattle Plague has done?—No; but history informs us of a general plague in cattle.

1776. Do you think that there any peculiar atmospheric influences in the year 1865 to induce the spontaneous origin of this disease?—I am not prepared to give an opinion upon that subject. I am satisfied that the disease which has been rife among cattle for many years past has been from baneful atmospheric influence, and I consider that it is this disease in a more aggravated form, from the extreme heat of the weather which we have had.

1777. Do you not know that in a very dry autumn we are always subject to mildew in our turnips and our grasses, and that it is nothing peculiar?—Yes; but we used not to be so; we were not subject to the potato disease; that was concurrent with the disease in cattle.

1778. That is not new this year, is it?—No; but it was concurrent with the general disease amongst cattle; it was just at the same time.

1779. Have you ever had any plague-stricken cattle of any foreign sort seized by the inspector?—Not one; I have sold lately 500 a week, and often 300 a week for years, and I never had one seized, and if we find out of the thousands of oxen which are exhibited in the London market not one which is diseased, is it not reasonable to conclude that it did not come from abroad? Look at the difficulties to which these oxen are exposed, which would be sure to illustrate disease if it was in their system.

1780. Have you ever had any plague-stricken English oxen or cows seized?—No. As regards the cows, I have declined to sell them, or to have any-

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thing to do with them, for months, and that may be the cause. At the commencement of this outbreak I declined it.

1781. Are not the the foreign stock now subject to the foot and mouth disease, and is it not very general?—They seldom are subject to it until they come here; they are subject to it after they come here.

1782. Are you not aware that in the month of June foot and mouth disease was of very rare occurrence?—Yes; and in nine years out of ten, even when the foot and mouth complaint has been general, just at the particular time when beasts are fed upon the grasses, the grasses have cured them. I think that I sold 6,000 beasts last year, from June to the end of November, and scarcely saw any with the foot and mouth complaint, at the fall of the year, when they were fed upon grasses; but in the spring of the year I have seen thousands in our London market with the foot and mouth complaint during the time when the easterly winds have prevailed, which has assisted me in my conclusion that it is from the atmospheric influence, because it is so much worse when the wind is one way.

1783. If the cattle were so particularly free from the foot and mouth disease in June and July, how does it come to pass that the disease is becoming so very virulent, now the weather is so much colder?—We have had easterly winds very generally prevailing, and that in my opinion is a great cause of it.

1784. Then why did you say that it was the extreme heat which aggravated the foot and mouth disease, so as to enlarge it into the Cattle Plague?—I look upon the foot and mouth complaint as the result of fever in the animal; it is only a struggle of nature to get rid of it in the extremities; it is a proof that the animal is getting well when it attacks the extremities, and it prevents its attacking any vital part.

1785. When the foot and mouth complaint is prevalent, and you drift cattle, do not they catch it; whereas when they are quiet upon the farm they seldom have it? Are they not almost invariably subject to it when they are drifted and congregated together?—Yes, and also when they are not drifted; and our cattle are so young, and are so much over fed, that they are much more subject to it than the foreign cattle; those coming from Oporto particularly are generally old cattle six or eight years old.

1786. You were in the Metropolitan Market yesterday; did you not see almost all the foreign stock suffering from the foot and mouth disease?—No, I did not; I saw some which were.

1787. A great portion of them?—No, certainly not; very few.

1788. Were not they particularly free from foot and mouth disease during the heat of the summer, much more than they are now?—Yes, I think so; I have seen many more instances lately than in the month of June.

1789. You have said that store stock are never sent to the Metropolitan Market?—Not to be sold for stores; but they are sometimes sold to keep, because they are worth more for that purpose than to kill.

1790. Are not hundreds of store stock sold in the Metropolitan Market and sent down to Norwich Hill?—I am speaking of the stock in England. My answer was given in connexion with store stock of England, which are never sent to the English markets, and a great many young beasts and calves are sent from Holland and other places which are worth more for stores than they are to kill.

1791. Are there not a great number of store cattle two and three years old, particularly from Holland, which come over to the Metropolitan Market, and are sold for store stock in the provinces?—Yes.

1792. Is not that the case even now, or has it not lately been so?—No; not lately. I do not know that they are sent on purpose for stores, but they are worth more for stores than to kill, and they are consequently bought for stores. I have had a large number every year of lean beasts sent to be sold to kill, but being worth much more money for stores they have been sold as stores instead of being killed.

1793. Were not there yesterday some foreign cattle in the market which were not worth 5*l.* each?—I did not see them. I had about 30 from Norway on Monday; they were worth very little money, but that was from their being so very diminutive; they were only about the size of calves; they were all sold to be killed.

1794. Were not they also very poor?—Not particularly so, but they were very diminutive, some of them not above the size of large dogs.

1795. Do you not know that the Metropolitan Market has been the great centre of this Cattle Plague?—I know that a great many cows have been sent there from the dairies; there has been no other place to which to send them to be killed; but I know that the disease is breaking out all round the country where no stock at all has been sent from the London market.

1796. I simply ask you whether you are not aware that the Metropolitan Market has been the great centre of the Cattle Plague; did we not first hear of it in the Metropolitan Market?—No; we heard of it in the dairies round London, and they sent some of those animals to the market.

1797. Was not the disease first heard of in London?—Yes.

1798. And did not the diseased cows go into your market?—Yes.

1799. And were not they sold in the market, and were not some of them taken to the provinces?—I do not know that any of them were taken to the provinces.

1800. You have said that if all the cattle which are sent to London should be slaughtered in London it would inflict an immense hardship upon the provinces?—Yes, very great indeed.

1801. I think you said that it was impossible to transport the dead meat so far as Leeds or Plymouth?—Sometimes it is impracticable and impossible from the heat of the weather, without spoiling it.

1802. During the autumn and winter months what particular hardship would it be?—It would entail a great deal more expense, and would increase the price of meat.

1803. How does it come to pass that you have so large a supply from Scotland; that is further than Leeds, is it not?—Yes.

1804. Does it come in good condition?—Exceedingly good in the winter time, but there are tremendous losses during the hot weather; there is a shocking destruction of food.

1805. You are very largely connected with cattle; do you consider this disease to be contagious?—Yes.

1806. Do you not know it to be infectious also?—Yes; from all that I have seen and heard, I firmly believe it to be so.

1807. Is it an old disease to you, or a new disease?—I have seen some of the external symptoms for years, but I have not dissected any animals, and therefore I am not able to speak upon that point.

1808. But you are so largely experienced in cattle, that you would know very well whether it was an old or a new disease to you; did you ever see it before?—I have seen the same symptoms in animals, but not to the same extent.

1809. Have you seen all the symptoms of the Cattle Plague in any one bullock before, in the whole course of your life?—I think not in this aggravated form, but I have seen that which has very nearly approached it, for many years.

1810. When you said that it was a good thing to stop the fairs, and not the markets, you meant that you would stop the markets for lean stock?—Yes; I should not think that any gentleman would send such beasts to the markets, because he would not find

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buyers, but there would be no harm in having the markets open for beasts intended to be killed immediately. I do not think it reasonable that anybody would send the animals for store stock, because he would not find any buyers.

1811. Do you not know that, whether reasonable or not, your market is still open, and that cattle are now sent to the provinces?—I do not know that store stock are sent to the provinces. I know that persons who are afraid to buy any home-bred animals in the country places come here and buy the foreign animals to slaughter; they are very often inspected half a dozen times over.

1812. And the English cattle would not be?—Yes, they would.

1813. Only once, would they?—Now I should think that they would be, because they are not allowed to come into the fairs unless they are sound. The Jews are the most particular people in the world about their meat, and they invariably buy the foreign stock, because the English stock have been far from healthy for many years past, and the Scotch too. I have seen some of the Scotch beasts affected with the foot and mouth complaint as bad or worse than any others; that may have been attributable to their having had to travel a great distance before they came to the rail. May I be allowed to make an observation as regards a proposition of which I have heard respecting a quarantine for the animals?

1814. (*Chairman.*) If you please?—It appears to me that it would be a very great hardship to keep those animals which are pronounced by eminent men to be sound until they become attacked by animals which are known to be unhealthy here, and that there would be a great waste; if you keep the animals a month there will be an immense loss.

1515. No quarantine is in existence now?—No, except in those cases where certain cargoes have come. I know a case where one animal was pronounced to be ill out of a cargo of I think 200 oxen. The rest had either to be killed, or be kept over for a month; the persons preferred killing all but ten; those ten belonged to Mr. Pool, and on this last Wednesday they have been passed, and pronounced to be perfectly sound; they have been in quarantine a month, and they have largely deteriorated in consequence.

1816. (*Mr. Read.*) If there were good slaughter-houses at the landing places would much loss follow to the importers from killing a few bullocks at the outports?—There would be immense confusion and immense loss to supply 3,000,000 of people in London.

1817. I am supposing that quarantine regulations are in force, and that one cargo is stopped; would it be any loss, if there were good slaughter-houses at the outports, to have those cattle killed there?—Yes; it would be a loss, because they would be thrown upon the market all at once, whether they were wanted or not, particularly if the weather was bad. But I think it very desirable to have good slaughter-houses, where the animals are obliged to be killed, because from the way in which they have been slaughtered heretofore, when I speak of a loss of 3*l.* to 4*l.* a head, that loss has been aggravated from the circumstances of there not being proper places to kill animals in.

1818. (*Dr. Playfair.*) Would a general quarantine of ten days for foreign cattle interfere much with the importation trade?—Yes.

1819. Would it stop it?—I think not entirely, but almost.

1820. (*Dr. Parkes.*) I think you said that cattle sent from the Metropolitan Market into the country for slaughter might be kept a week by the butchers or some days?—They would not be likely to keep them longer than a week; in eight cases out of ten they would kill them in the first three days, because it is an established fact that beasts after they have travelled, and have been taken away from their usual food, become deteriorated, and lose quality, and consequently it is the interest of the butcher to kill them as soon as possible.

1821. But there is no certainty that the slaughter would be immediate?—No; but there is a probability that the slaughter would be within three days.

1822. (*Chairman.*) Is there any other observation which you wish to make?—I may mention that I am very anxious to take some step as to alleviating the sufferers; and I am sure that the public are anxious to do so. If local subscriptions were established where bad cases have occurred, the people are so ready to help the sufferers that I am sure it would be done. Mrs. Laycock, a poor widow woman, lost 2,000*l.*, and I obtained 380*l.* in a few days; and if local charities of that kind were established I am sure that the public generally would respond to the appeal.

The witness withdrew.

A. Helps, Esq

ARTHUR HELPS, Esq. examined.

1823. (*Chairman.*) You are Clerk to the Privy Council?—Yes.

1824. Will you be good enough to state to the Commission the measures which were taken by the Privy Council with regard to this outbreak?—The date of the first notice to me of the outbreak was the 10th of July. I immediately requested Professor Simonds to institute an inquiry into it. I received his report on the 14th of July. I was then directed by the Lords of the Council to ask the law officers to draw up an Order in Council to embrace the views of Professor Simonds. These were twofold; first, that all persons, cowkeepers and others, where there was disease, should give notice of it; and, secondly, that a power should be given to inspectors to examine. The Lords of the Council had several meetings; and, on the 24th of July, they issued their first order; that was the order which directed that all persons, within the city of London and the Metropolitan Police District, having any diseased animal should report the fact to the Clerk of the Privy Council; that he should appoint inspectors; and that these inspectors should have power to enter the premises and examine.

The disease increased, upon which, on the 11th of August, the Lords of the Council issued another order, still applying only to the Metropolitan district. In that order the chief additional provision was, that no animal labouring under the disorder should be removed from the premises on which the disorder had broken out, without the licence of an inspector.

On the 11th of August also an order was published which applied to the remaining parts of England and Wales, other than the Metropolitan Police district. In this order the local authority was defined; and the principal local authority in the country, were the justices acting in and for the petty sessional divisions of the county. They were allowed, in cases where the disease had appeared within their jurisdiction, to appoint an inspector. Then certain rules were given for the inspector, similar to those which had existed in the Metropolitan district, namely, that no person should remove, without the licence of the said inspector, any animal labouring under the disease. There were, however, in this order important provisions made with respect to the burial of the infected animal and the disinfection of the premises.

On the 18th of August the provisions which had been made for England and Wales, were extended to Scotland.

On the 25th of August there was an order passed, affecting Ireland, namely, that no cattle (and it is stated that "the word cattle shall be interpreted to "mean any cow, heifer, bull, bullock, ox, or calf") were to be removed "from any port or place within "that part of the United Kingdom called Great "Britain, to any port or place within that part of "the United Kingdom called Ireland."

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On the 26th of August another order was passed, of which the important part was this, that the justices should not only have power to appoint an inspector when the disease was absolutely in the district, but when they should "have reason to apprehend the approach "of the said disease to the district." There was also in this order a power given to the inspector "to seize "and slaughter, or cause to be slaughtered, any "animal labouring under such disease.

Orders were then passed, on the 7th and 13th of September, relating to the importation of hides and skins into Ireland.

On the 22d of September an order was passed, relating to Great Britain, consolidating all the previous orders, modifying them in some small matters, and adding two important provisions, one affecting the Metropolitan Cattle Market, and the other giving the local authority the power to prevent the animals defined, or some specified description thereof, from entering a market or a fair within the jurisdiction of that local authority.

The disease was then supposed to extend to sheep and lambs, upon which an order was issued on the 29th of September prohibiting sheep or lambs from being imported into Ireland from Great Britain.

There was then an order passed for the island and barony of Lewis in the county of Ross, prohibiting cattle of any kind from coming into that island from any part of Great Britain. Those are all the orders which have been issued. There have been certain other documents published, in some measure under the authority of the Council; for instance, papers containing suggestions on the part of Professor Simonds, and a memorandum on the principles and practice of disinfection, by Dr. Thudichum.

1825. In the last consolidated order was not there a provision that no cattle should come to the Metropolitan Market except for the purposes of slaughter?—Yes. This provision was made on account of the very general complaint in the country districts that the disease had come to them from the Metropolitan Market; and it was supposed that if cattle were brought to the Metropolitan Market solely for the purpose of being immediately slaughtered, and if those cattle were marked, it might greatly tend to prevent the spreading of the disease from the Metropolitan Market to the country districts.

1826. Does the same provision refer to the country fairs and markets?—No.

1827. Has there been any similar provision on the subject of country fairs and markets?—No.

1828. Is it in the power of the magistrates in petty sessions now to stop a fair or market?—Yes. Under the provision affecting the Metropolitan Market, the cattle might come to the market, but were to be sold there only for immediate slaughter. The other provision as regards the prevention of a market or fair, enabled the local authority to forbid specified stock from coming into it.

1829. Will you describe that part of the order which relates to the country?—Whenever any local authority, the local authority being herein-before defined, declares by notice, published in a newspaper, that it is expedient that animals, or some specified description thereof, shall be excluded from any market or fair, it is not lawful for any person to bring or send into that market any such animals so described.

What I have mentioned are all the public papers which have been issued by the Council.

1830. Have you any memoranda or other papers which you think it important for the Commissioners to have before them?—I think it is desirable that the Commissioners should know what has been done with regard to burial in the metropolitan district, the arrangements for which were completed on Wednesday last.

1831. Will you state generally the effect of those papers, and then put them in?—There are to be three modes of burying in the metropolitan district. "No. 1. "Where there is a suitable place, on or immediately adjoining the premises where the animal has died or "has been slaughtered, the carcase may be buried there "according to the provision No. 17 of the order of the "Lords of the Council of the 22d of September, viz., "with its skin on, and with a sufficient quantity of "quick lime or other disinfectant, the carcase being "covered with at least five feet of earth."

The second method is, "where it is not desirable to "bury an animal on or immediately adjoining the "premises," whether on account of the injury to the owner himself, or to the public generally, "the "inspector is to have the carcase disinfected, and "afterwards it is to be disposed of (with the consent of the owner) in such manner as the inspector "may direct." It may be matter of private negotiation between the inspector and sundry other persons, as to how the carcase, after being disinfected, should be disposed of. An individual can take this carcase, for such a purpose, or for another purpose, it being thoroughly disinfected. The inspector, with the consent of the owner, can deal with it in any way that he pleases. "No. 3. Where the owner cannot properly bury the animal on or near his premises, and "where he will not consent to the disposal of the "carcase in such a manner as the inspector may "direct, the leaving of the carcase unburied will "give rise to a nuisance, and the inspector of cattle "will be instructed to lose no time in giving notice "to the Inspector of Nuisances for the district, or "to the police, in order that immediate action may be "taken under the Nuisances Removal Act, with the "supervision of the local authorities." Those are the three modes of disposing of the carcase which the Lords of the Council have ordered to be adopted for the Metropolitan Police District, their Lordships agreeing to supply disinfectants to the inspectors for use within the limit of that district.

The witness delivered in the following papers:

"Sir, "Whitehall, 10th October 1865.

"I am directed by Secretary Sir George Grey to acknowledge the receipt of your letter of the 5th instant, transmitting a copy of a correspondence between the Lords of the Council and the Commissioners of Sewers, upon which you request his opinion and advice.

"The Commissioners of Sewers in their several resolutions have expressed their opinion—

"That it is impossible in the city of London and in the metropolis generally to bury the animals affected with the Cattle Plague on or near the premises where they die or have been slaughtered;

"That the practice of disposing of such animals in the slaughter-houses and knackers'-yards of the metropolis should be discontinued, as being likely to propagate the disorder; and,

"That such practice is also likely to be dangerous to the public health, because the slaughter-houses and knackers' yards are for the most part situated in crowded localities and in common thoroughfares.

"The Commissioners therefore recommend:

"That places should be set apart where all such animals should be disinfected and disposed of, and that such places should be provided by Government.

"I am directed by Sir George Grey to acquaint you, for the information of the Lords of the Council, that he concurs in the opinion which you express, that if it be necessary to provide such places as have been suggested by the Commissioners, the matter is one which it is not within the province of Government to undertake, and which should be left to the local authorities.

"It certainly might be dangerous to bury carcases of animals affected with the Cattle Plague in thickly populated districts; but Sir George Grey has received no representation that the cattle inspectors have exercised improperly the power given to them by the 10th section of the order of the Lords of the Council of the 22d of September to cause such carcases to be buried in convenient places.

" With reference to the authority to direct the disposal of the carcases, with the consent of the owner, otherwise than by burial, which is given to the inspector by the 17th section of the order, Sir George Grey has recently sent to the Lords of the Council a report furnished at his request by Mr. Holland, Inspector of Burials, showing that means exist by which carcases of diseased animals can be completely disinfected.

" Other efficient means of effecting the same purpose may be known to the Lords of the Council, and if information on this subject is given to the public, and the inspectors of cattle are authorized, when necessary, to supply the means of thoroughly disinfecting the carcases at the place of death, there seems no doubt that they may be properly and safely disposed of without providing special places for the purpose.

" Should the owner of a carcase of a diseased animal refuse to obey the direction of the cattle inspector as to its disposal, Sir George Grey would suggest that application should be made to the inspector of nuisances of the district, or to the police, in order that the provisions of the Nuisances Removal Acts may be put into force under the supervision of the local authorities.

" I am, Sir,
" Your obedient servant,
" (Signed) T. G. BARING.

" The Clerk of the Council,
&c. &c."

" Privy Council Office,
" Sir, Whitehall, 11th October, 1865.

" Referring to the correspondence which has passed between this office and the Commissioners of Sewers with respect to the disposal of animals that have died of the Cattle Plague, or have been slaughtered in consequence thereof, I am directed by the Lords of the Council to write to you as follows, for the information of the Commissioners:

" Their Lordships have consulted Secretary Sir George Grey upon the subject, and have received a letter written by his direction, a copy of which I herewith enclose.

" In the Metropolitan Police District the inspectors appointed by the Clerk of the Council have been instructed not to order the burial of any animal (under the 10th section of the order of the Lords of the Council of the 22d September 1865), in any place where to do so would be likely to be injurious to the public health.

" In that district, therefore, subject to the foregoing instruction, the disposal of all animals that have died of the Cattle Plague or have been slaughtered in consequence thereof will take place according to one or other of the three following methods:—

" No. 1. Where there is a suitable place on or immediately adjoining the premises where the animal has died or has been slaughtered, the carcase may be buried there according to the provision No. 17. of the order of the Lords of the Council of the 22d September, viz., with its skin on, and with a sufficient quantity of quick-lime or other disinfectant, the carcase being covered with at least five feet of earth.

" No. 2. Where it is not desirable to bury an animal on or immediately adjoining the premises, the inspector is to have the carcase disinfected, and afterwards it is to be disposed of (with the consent of the owner) in such manner as the inspector may direct.

" No. 3. Where the owner cannot properly bury the animal on or near his premises, and where he will not consent to the disposal of the carcase in such a manner as the inspector may direct, the leaving of the carcase unburied will give rise to a nuisance, and the inspector of cattle will be instructed to lose no time in giving notice to the inspector of nuisances for the district, or to the police, in order that immediate action may be taken under the Nuisances Removal Act, with the supervision of the local authorities.

" The Lords of the Council having every wish to facilitate the disinfecting and disposing of the carcases of diseased animals, have ordered that disinfectants shall be supplied to the inspectors of the Metropolitan Police District for use within the limits of that district.

" I am, &c.
" (Signed) ARTHUR HELPS.

" J. Daw, Esqre."

1832. Can you give the Commission any idea as to the manner in which these precautionary measures of the Privy Council have worked throughout the country?—I believe they have worked well. There have been very few complaints, comparatively speaking, of the way in which the various provisions contained in these orders have been brought into operation. The letters addressed to the Privy Council have contained suggestions rather than complaints. After the various Orders in Council had been published, there were generally requests that these orders should be made more stringent, and be carried further. I think that the time when most complaint of any sort was made was during the interval which elapsed after the publication of the Order in Council which gave the local authority power to appoint inspectors, only in those districts where there was already disease; that was remedied in about a fortnight, by giving the local authority power to appoint inspectors where there was an apprehension of the disease. Perhaps your Lordship would like me to mention what has been the chief difficulty which has been brought forward after the publication of the last consolidated order in reference to fairs and markets. There have been many magistrates attending at the Home Office and at the Privy Council Office, within the course of this week; and what they have said is this: " It is no good our preventing a fair in this Petty " Sessional district if there is to be a fair held " nearly at the same time in a district adjacent to it; " if the magistrates of that adjacent district will not " act under this order, the result, desired by our- " selves and by the Government, may fail to be " obtained." Several of them saw me at the Council Office, and I afterwards put them in communication with Sir George Grey and Mr. Baring. The result was, that Sir George Grey issued yesterday a letter, which I will put in, in which he calls the attention of the justices at the approaching quarter sessions to the state of things, with regard to forbidding fairs and markets; and he suggests that it is desirable that the various local authorities should as far as possible act in concert, with a view to the effectual exercise of this power. I may mention that the great difficulty which has arisen within the first week or two after the publication of the order with respect to fairs and markets has been this, that sufficient notice could not be given to the dealers, and consequently the herds had come up. It requires a few weeks before the order can be known; people bring up their cattle, and must contrive to sell them; and consequently the advantage of forbidding the market has been in a great degree counteracted.

1833. But when once known you have no reason to believe that there would be actual opposition to it?—I think not.

The witness delivered in the following letter:

" Home Office, Whitehall,
" Sir, " 12th October 1865.

" I am directed by Secretary Sir George Grey to inform you, that it has occurred to him that it may be desirable that the attention of the justices of the county of should be directed at the approaching quarter sessions to the order of the Lords of the Privy Council of the 22d ultimo with reference to the Cattle Plague.

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"Under section 19. of that order the justices acting in and for any petty sessional division (whether in ordinary or special sessions) can, by notice, make it unlawful for persons to bring or send, during a specified time, animals as defined in the order or any specified description thereof to any market or fair in their division.

"This power has already been exercised in several instances; but it has been represented to Sir George Grey that the advantage to be derived from it will be materially impaired if, while the power is exercised with reference to some markets or fairs, no action is taken with respect to others in the neighbourhood.

"It is clearly desirable that various local authorities should, as far as possible, act in concert, with a view to the effectual exercise of this power; and Sir George Grey will be happy to be the means of communicating, if necessary, between the justices of the county of and other local authorities, as defined in the order, with respect to any proceedings which the justices may think it expedient to take on this subject.

"As it is obviously important that ample information of any order, made for the purpose of preventing animals being sent to any market or fair, should be given to the public, not only in the immediate neighbourhood of the market or fair, but also in the district from which the market or fair is supplied, I am to suggest that means should be taken for the widest possible circulation of such information, by means of the chief constables of the county or counties concerned, or otherwise as the justices may think expedient.

"I have," &c.

1834. Has this order been generally carried out?—No; it having been so short a time in operation, namely, since the 22d of September; but already there have been a good many fairs I believe forbidden, namely, in Buckinghamshire and in Oxfordshire. It is beginning to be acted upon with considerable vigour.

1835. With regard to that part of the order which relates to the Metropolitan Market, will you state how that has worked?—I am afraid that I cannot give much minute information upon that point. I believe that Mr. Tegg has stated to the Commission that very few diseased beasts have been brought in since that order.

1836. Do you believe it has stopped the animals coming to market to be sold as store animals?—I should think that it had, to a considerable extent, because, though there may be many instances in which the animals have gone from the Metropolitan Market to distant places, yet I think that it has been to contractors, to Aldershot, and to Plymouth. I do not think that these have been store cattle.

1837. What becomes of animals which are sent to the market, and are not sold?—Upon that point I think that the chairman of the markets would be able to give you better information. I am afraid that they have gone back to the owners in many instances.

1838. Have you reason to be satisfied with the manner in which the inspection of the cow sheds and the inspection of the London district has been carried on?—Yes; it was an extremely difficult matter. Very frequently there was considerable resistance to the inspector; he was naturally looked upon as an enemy. Very few complaints have been made to me of the conduct of the inspectors in my district.

1839. Do you believe that the staff of inspectors has been sufficient?—Perhaps there might have been more appointed with advantage, but in every instance where persons in the locality have represented to me that there has been a deficiency I have caused it to be inquired into, and have had the number of inspectors added to.

1840. Has there not been considerable difficulty in carrying out the orders of the Privy Council with regard to the burying of the dead bodies, the burying of the hides, and so on?—Considerable difficulty; in the first place, in London they attempted to bury in a yard in or near the man's premises, and very frequently it interfered with the sewers or with some underground work, and it has been almost physically impossible to carry out the burying in or near the premises. The inspectors have done the best they could in getting the carcases buried anywhere. For some time large numbers were sent to the Isle of Dogs; it was supposed that they would do for manure, but the manure was, I believe, refused by the farmers, and therefore the Isle of Dogs people would not take any more of the carcases. There has been an extreme difficulty, from the nature of things, in getting the diseased animals buried in the metropolitan police district.

1841. Will you state the organization of the inspection in the metropolis?—The owner of cattle having the disease reports the fact to the Council Office; that is, without delay, communicated to the veterinary department, and immediate inspection takes place.

1842. There is a head inspector belonging to the veterinary department?—Yes, Professor Simonds, who has often gone down upon special occasions into the country when there has been anything remarkable which has occurred there. For instance, he went, by my orders, to examine at once into the rumoured outbreak of disease amongst the sheep.

1843. How many inspectors are there under the immediate control of the head inspector?—I think that there are from 20 to 24 at present.

1844. Are there any local authorities who have power to inspect and who assist the inspectors appointed by the Privy Council Office?—No; there are inspectors for the Customs, as your lordship knows.

1845. There are no parish inspectors?—There are medical officers of health and the inspectors of nuisances, who have undertaken the inspection of cowsheds as a part of their general sanitary business.

1846. Can you give the Commission any idea of the extent of the disease now in England?—I am sorry to say that the veterinary department have not yet mastered that part of the subject, they have not yet got such returns as can be shown, but I am informed that they will have them in a day or two.

1847. Can you give us a list of the counties in which there has been an outbreak of the disease?—I think that the veterinary department would know that pretty accurately; but I would rather not, without consulting them, attempt to put in a statement which would probably be imperfect.

1848. (*Dr. Parkes.*) Referring to the order in Council that beasts should be sent to the Metropolitan Market for immediate slaughter, supposing that a butcher bought beasts there, and took them down into the county of Kent, for three or four days or a week, and grazed them during that time, as he would probably do, would that be opposed to the spirit of the order?—Yes; I think it would.

1849. By immediate slaughter is meant in all probability slaughter within 24 hours?—I should hardly say that. I knew (I do not know whether it was generally known) that it was not the the case in London, but that beasts were found in butchers' places for three or four days.

1850. If they were taken down into the country and grazed, that you think would be contrary to the spirit of the order?—I think so.

1851. (*Mr. Read.*) Was not the first order in Council wholly inoperative as regard the Metropolitan dairies; did not the cowkeepers first of all get rid of their cows, and then tell the inspector that the disease was upon their premises?—In a great many instances they did.

1852. There is no superintendent of inspectors in the provinces, I suppose; no head inspector, for instance, for a county?—No.

1853. Do you think such a thing desirable?—I do.

1854. May I ask you who Dr. Thudichum is?—

He is one of the medical men employed by the medical department of the Privy Council.

1855. He says that cattle can "accidentally carry "the poison from other animals in a dormant state "upon some part of their surface, their hair, and "particularly their feet, and may therefore infect "other cattle without becoming themselves subjects "of the plague." Have you any idea from what source he obtained that information?—No.

1856. (*Professor Spooner.*) Would it not be advisable for the Lords of the Council to issue some special order with regard to the means of disinfection?—There is a letter which I will send to the Commission to-morrow which is to be issued in the metropolitan police district by the veterinary department.

1857. (*Dr. Playfair.*) Is it Dr. Holland's letter?—No.; I think that they have the letter in question in preparation at this minute up stairs.

1858. (*Viscount Cranborne.*) Can you tell the Commission what orders in Council have been issued in Ireland?—None, I believe.

1859. Have no precautions whatever been taken there on the part of the Government against the disease? Not that I am aware of.

1860. No inspectors have been appointed?—No inspectors have been appointed.

1861. Not even at the ports?—I think that there has been one for Dublin.

1862. And only for Dublin?—That is all that I have heard of; but this is a matter which only the Irish Government could inform you upon, and I cannot say for certain, how it is.

1863. (*Chairman.*) Have you anything else to which you wish to draw the attention of the Commission?—I would like to say something, but the Commission might think that it was rather out of my province. I am speaking now quite as a private individual. I think that it is very desirable to give a great deal of the working of these Orders of the Lords of the Council to the local authorities. You will say, perhaps, that at the present moment they have been rather slow. They always are so at first in these matters, but I think that it is very important in this case to give much power to the local authority, on this account. You have an evil of the greatest magnitude, embracing innumerable details which cannot adequately be met by the wisest and most stringent Orders in Council which can be imagined, and to meet which I think you must rely upon the people,—I mean the magistrates, the farmers, the cattle dealers, the herdsmen, if you are successfully to attack it. They must act thoroughly and heartily with you. I will take one instance, namely, the disinfection of manure. Do what we will, how can any central authority manage with respect to such a thing as that? But if there is great discussion in a county, the magistrates are very much interested in the matter, and not merely that, but there are county meetings, and the whole question is largely discussed amongst the farmers, and private individuals bestir themselves in every way. I look upon those discussions as of the highest importance, as regards local action. I have had several magistrates with me this week, and one has said to me, "I was on horseback "from morning to night attending to the fair and "endeavouring to prevent the herds of cattle coming "in." I thought that if it was a Government order that he was carrying out, and if he had had nothing to do with it himself, he would not have been so energetic as he was. I feel that the very magnitude of the evil, as it enters into thousands of details, must be met by very general co-operation; and I do not believe that you will ever have very general co-operation unless you give power to the local authority. I will explain my views still further: I may say that I have been thinking of this subject for many months, and I have thought, what have foreign governments done? After all, you cannot say that their efforts have been wonderfully successful, except in Prussia. Prussia has apparently kept the disease out, but where it has got a footing similar to what it has got in our own country, it has been only isolation and slaughter that have been adopted, and consequently, though this disease has been existing for years in certain foreign countries, they have not got rid of it. Now, I consider that the plague having come amongst us, the people, in their quiet way, by local self-government, will adopt wiser precautions, and more will be done than has been done among any other people. From what I have had to do with the local authorities, it has really given me more confidence in the people generally, and made me extremely averse to centralization. I think that the Government has acted very judiciously in putting forth all manner of information. I strongly believe that the first paper put forth by Professor Simonds did an immense deal of good, and one thing which he advised, namely, "when you buy any stock keep it in quarantine," has been largely acted upon, and has done a great deal of good. I believe that this Commission or the Government can recommend things which would be followed out very patiently and carefully if you would commit the execution of these measures to the local authority. In this particular case the disease has not spread with extraordinary rapidity; we seem to have some little time before us; it has only touched upon a few places in Great Britain, comparatively speaking, and therefore if you could succeed in making all the people act with you, there seems to be sufficient time for doing so, and I think that it is our best chance. I know how much there is to be said on the other side, and I simply venture to make the suggestion that you should not neglect the local authority, as, after all, you must depend greatly upon it.

1864. It would be necessary for the Government to originate a scheme, and for local authorities to carry it out?—Certainly.

1865. (*Dr. Playfair.*) You are probably aware that in Poland, where the restrictive measures have been so successful, the Government threw the execution of this duty upon the local authorities, and that the Government take very little action, but depend upon the local authorities for stamping out the murrain, and for carrying out the measures?—I am not aware of that. I have read the despatch, but that point did not arrest my attention.

1866. (*Viscount Cranborne.*) Will you state more in detail to what extent you would restrict the action of the central Government in interfering with the local authorities? Would you merely give to the local authorities the execution of the policy devised by the central Government, or would you leave to the local authorities the discretion whether they would adopt that policy or not; for instance, with respect to the matter of closing fairs and markets?—I feel that that is a very difficult question to answer, but I will boldly say that I would leave to them even the adoption of the policy when you have indicated it. When the policy is well indicated and well talked of right round the country, I believe that those local authorities will work as well as the Government would in furthering the policy.

1867. With reference to stopping fairs and markets, does it not occur to you that the power of stopping them, if you committed it to the local authorities, would reside in one set of persons, and that the interest in stopping them would press upon another set of people, that is o say, that the contagion is not generally most spread about by the fair and market in the place where the fair and market is held, but in the places from and to which cattle are sent from that fair and market, which may be at a distance?—I feel that difficulty, but at the same time I should think that the general good feeling which mostly guides mankind would conquer it; perhaps you may say I am too hopeful about the matter; but I think that there is patriotism enough in the country at large to overcome petty local interests. I think that you will find that in the next few weeks fairs and markets will be very considerably stopped.

1868. It is said that the Liverpool market is one of

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the great dangers at the present moment. It is obviously not the local authorities who suffer most, but the agricultural districts in Lancashire?—Do you think that there is sufficient public spirit in Liverpool to meet that?—Yes.

1869. Do you not think that the cattle will die before the public spirit has got to work?—There is that danger. That is the other side of the question. But, I repeat, that I would trust greatly to well-guided local effort to check the disorder; and I believe it will exert itself in time to do so.

1870. Would you not extend this local authority somewhat more widely than it has been extended hitherto, and at least vest the powers in the quarter sessions?—I speak with great deference about that, for I know that one great legal authority thinks the contrary. The petty sessional division was not taken until after a good deal of thought upon that point, but I confess that the other view of the question had occurred to me.

1871. Such a question as stopping the importation from the Metropolitan Cattle Market you would not leave to the local authorities, but would leave to central interference?—Certainly.

1872. And all questions of importation from abroad you would regard as questions of central interference?—Certainly; these are imperial questions.

1873. (*Mr. Lowe.*) Do you think that the local authorities are already possessed of sufficient power to deal with this question? You say that they are very good men, and wish to do it; but do you think that they have the power, or do they require fresh power in that way?—I will take a particular case. I will take the case of fairs and markets. I think that the local authority may not have sufficient power under section 19 of the order of the 22d of September. It is very probable that when this Commission looks into the matter, it may find certain words to add to the section in the Order of the Lords of the Council upon fairs and markets, which would give the local authority fuller powers; but, it being granted that it will be improved if it is improveable, I believe that it will be more prudent to intrust action to the local authority than to have some central authority regulating it all.

1874. I do not exactly understand what, in your view, this Commission is to do?—In that very instance, about fairs and markets, you might say that you could see very great improvement that might be made to section 19 of the Order as to what the local authority or the Government might do in forbidding fairs; but my point is this, whether you would not gain more in the long run from putting that power into the hands of the local authority than into those of the Government?

1875. Your impression is, that if any fresh legislation is required, it should be in the direction of putting power into the hands of the local authorities rather than of the Government?—Yes.

1876. (*Mr. Read.*) If there is one good line of action would it not be more uniform through the interference of the Government?—I think that it would.

1877. We will take a special case; for instance, Norwich Hill, which is a great weekly market under the jurisdiction of the mayor and corporation of the city of Norwich; it might be quite possible that all the county magistrates should wish the closing of every fair and market in the county, but if the Mayor and Corporation did not think so, they could keep the Norwich market open?—No; but I think that there might be a combined action suggested by the Commission which would preserve what I have ventured to put before you, namely, the immense advantage of interesting all these people locally, and yet advising and even prescribing a clear course of action for the country generally.

1878. Do you not find that local authorities take very different views of a case; for instance, the Norwich Corporation might say, "We shall lose all our tolls for two or three months;" and they are the persons who would be benefited by keeping the market open, whereas the county would be the sufferers?—If it were found to be the case that these small local interests prevented judicious action, I should immediately admit that my view breaks down, and that you must have the strongest central authority.

1879. (*Viscount Cranborne.*) But before that could be ascertained, the cattle would be dead?—I will ask whether the disease has progressed at that rate at present as to make it imperative that the central Government should act alone, without reference to local authority? I do not think that it has.

The witness withdrew.

Mr. C. Hicks.

Mr. Charles Hicks examined.

1880. (*Chairman.*) I believe that you are Chairman of the Foreign Cattle Importation Association?—I am.

1881. Are you in any other way engaged in the cattle trade?—I am a salesman of cattle.

1882. Has there been a large number of foreign cattle imported into the country in the last few years?—Yes, exceedingly large; this year more than ever before.

1883. Can you give to the Commission any return of the number of foreign cattle imported into the country?—I cannot say for certain, but during the last three months I should say that there have been at the rate of about 3,000 or 4,000 head of cattle per week, and perhaps 13,000 to 14,000 sheep; in the spring the number is not so large; perhaps about 1,500 head of cattle per week and 6,000 or 7,000 sheep.

1884. Has the number increased lately?—Yes; this year we have had more than ever before.

1885. How do you account for that?—The fact is that the London trade has become more spread through all parts of the continent; we have received this last year or two cattle from countries which formerly sent none, that is to say, from Sweden, Prussia, and France, and I believe also from Hungary, and from Galicia.

1886. Can you state to the Commission the different countries from which you import cattle?—I receive cattle from Sweden, Denmark, Germany, Holland, and France.

1887. Do you receive any Hungarian or Russian cattle?—Very seldom; in fact we cannot say exactly where they come from, because these cattle are generally consigned to London by dealers in Hamburg, or Magdeburg, or Berlin, and therefore we only receive them from the port of embarkation; but still there is no doubt that cattle are sent to this country from Bohemia, Hungary, Gallicia, and Prussia.

1888. Can you state generally how the trade is conducted?—That is very various; the cattle coming from Hungary, Galicia, the Rhine, and different parts of Prussia, and Mecklenburg, are generally speaking sold in the markets of Hamburg and Berlin, and are then consigned to London salesmen by dealers; but from Sweden, Holland, and partly from France, and from Schleswig-Holstein they are consigned by the owners.

1889. In the first places which you have mentioned it is a speculation of foreign cattle dealers?—Quite so.

1890. Though you do not yourself import many cattle from Hungary, you can probably tell the Commission what number of cattle generally come from Hungary to this country?—I cannot.

1891. You cannot state the route by which they come to this country?—I cannot.

1892. With regard to the cattle as to which you

can give information to the Commission, will you state the regulations which exist in the countries from which they come with respect to their exportation from those countries?—In many instances the cattle are brought to the place of shipment, and are there examined by a veterinary surgeon; that is the case at Tonning, from whence there are now imported weekly something like 2,000 head of cattle; the same thing takes place in Holland, and I think that that is all. I think that from other parts the exportation is free; but at the same time, since the plague has shown itself in this country and also in other parts, the exporters of cattle have taken the precaution to have them examined previously to shipment, and they send a bill of health along with the cattle to show that they are shipped in good faith.

1893. Are there Government inspectors at the ports from which the cattle come?—No, I think not; in some parts of Holland there are. Veterinary inspectors are appointed in Holland, but I think not elsewhere.

1894. Can you furnish the Commission with a return of the number of cattle coming from each of those countries which you have mentioned?—Yes. I think that I can do so very nearly, but not exactly.

1895. Will you have the goodness to do so?—I will.

1896. Can you tell the Commission in what countries at the present moment the Rinderpest exists?—All that we know is, that about the middle of July or August certain number of cattle, 23, were sent from the Metropolitan Market back to Scheidam, and that those cattle took that complaint along with them; otherwise, wherever I received my cattle from, that is to say, Sweden, Denmark, Schleswig-Holstein, and France, they had not the complaint.

1897. Is there any Cattle Plague in Hungary at the present time?—I have only read of it in the papers; I have no knowledge upon the point.

1898. Have you observed this disease among the foreign cattle which have come to the English market?—Certainly not; but perhaps I may add, that I have seen cattle which have come from abroad which have stood in the market for sale, and have been, as we say, turned out unsold, they have taken the complaint after being exposed for sale; but I have not seen, with the exception of one or two, which have come from Holland, since those cattle were sent back, a single case of an animal from the countries which I have spoken of which has brought the complaint here.

1899. Then it is not your opinion that the origin of this disease in England is to be attributed to the foreign cattle?—I have made every inquiry, and I have not found a single proof.

1900. With regard to the foreign cattle which you import in this country, do they ordinarily come fit for the butcher, or do they come to be sold for grazing purposes?—They come here for the purpose of being killed, but their condition depends exceedingly upon the season. This year our importations from Schleswig-Holstein have been in a very poor condition, and but for the complaint which is now raging many of those cattle would have been sold for grazing; but of course as the complaint has made that business so dangerous we have had to dispose of them for killing at very small prices.

1901. What is the proportion in ordinary times of the cattle which come for the butcher and those which come for grazing?—From Holland they send occasionally a large quantity of small cattle, what they call "sterks," about 6, 8, or 10 months old, but otherwise the cattle coming from abroad came wholly for the purpose of being killed; it is only in bad seasons that we receive cattle which are not good enough for killing.

1902. You told us just now your opinion with regard to the inspection in foreign ports of the cattle which are sent to England; how is the inspection at our home ports carried out?—I think very fairly; but still I think that in justice to our trade there should not be so much power put into the hands of one man. I had for example a small cargo of cattle which was stopped at the port of Thames Haven about three week since; the surgeon there thought that they had the complaint, and there is no doubt that he was exceedingly mistaken.

1903. (*Mr. Read.*) What do you mean by "the complaint?"—This plague. Thereupon these cattle were put into quarantine and stopped there for ten days, and after that they were released.

1904. (*Chairman.*) What was the quarantine?—They were put upon a piece of land of about three or four acres; they were railed round, and a custom house officer was put in charge, and they remained there for ten days, and were then released. I think that in fairness to the consignors of cattle from abroad, where there is a suspicion that cattle have this or that complaint, at least two or three experienced men should give their opinion.

1905. To whom did this land upon which those cattle were placed belong?—I believe that it belonged to the Tilbury and Southend Railway Company.

1906. Has it often before occurred that animals coming from abroad have been put into quarantine such as you have described?—It has happened about three times of late. It happened with regard to a cargo of cattle from Holland by the "Maas," about a month since. There were three cows on board, which were suspected, and I believe that they had the complaint, and upon that account they were all stopped, and most of them were killed and sold. Then there was a cargo of cattle stopped at Harwich about a fortnight since.

1907. At what port were the cows which you have mentioned killed?—At Blackwall, and there was also a cargo stopped at Harwich, which animals were likewise killed, but a proceeding of that kind entails a very heavy loss.

1908. What became of the rest of the cargo?—They were all killed and sold.

1909. They were all put into quarantine?—Yes.

1910. Were they condemned by the Government inspector?—No; they were not condemned, but they were put into quarantine as a measure of precaution. If they had shown symptoms of complaint during that time they would have been condemned, but many of them were slaughtered by order of the owners, and others of them went through the time and were released.

1911. What are the ports in England where the largest number of foreign cattle are disembarked?—London and Hull are the two largest.

1912. Is there much preference shown to the port to which these cattle are brought from abroad?—London is by far the most important one, because in London there is always a sale. It there depends only upon the price; we only have to take a certain amount less, and we can always sell; whereas in Hull or in other places the demand is only small, and beyond a certain number of cattle cannot be sold.

1913. It sometimes happens that cattle coming to England are sent to Hull in preference to another port?—Yes; because occasionally during stormy weather the port of Hull is reached so much earlier.

1914. The inspection of cattle is not more severe at Hull than in London?—I think not.

1915. You have observed the Order in Council which restricts the animals sent to the London market to those sent for the purposes of slaughter?—Yes.

1916. Has that had any effect upon the foreign trade?—I have observed none, and I do not see how it should, for since the outbreak of this complaint we have had no buyers of cattle for stock; that trade has entirely ceased of itself.

1917. Do you believe that that Order in Council is effectually carried out?—I believe so.

1918. So that really no animals leave the market for the purposes of grazing?—That I can hardly say; but as soon as animals are sold for slaughter it is the

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custom of the trade to cut the hair off the tails, and I believe that now all cattle leaving the market have the hair cut off before they go, therefore they go away with a mark which shows that they have come out of the Metropolitan Market; consequently any person who would buy an animal of that description would buy it with his eyes open, knowing that it had come from a place where the plague existed.

1919. Then it is not your opinion that if this order was strictly carried out it would interfere with the foreign trade in cattle?—I cannot say that; I think that it would do our trade some harm, but of course in a matter of public importance private interests must give way.

1920. Then I gather from what you say that you think that this Order in Council is important for the purpose of checking the disease?—Yes, I think that it is a very good order.

1921. Have you any connexion with the home trade?—No.

1922. (*Mr. Lowe.*) What suggestion would you make with regard to the quarantine?—I think that at the present time the cattle are brought to London and unshipped at wharves where there is very little accommodation for the trade. I think that if the system of quarantine is one which is to be adopted, the cattle should be unshipped at a place or places where there is ample accommodation in case they are suspected of being touched by any contagious complaint, where they could be sold and properly slaughtered, and by these means realize about half their value. At the present time cattle come to London 400 or 500 in one vessel; they are brought on to a wharf where there is no room, and are there killed; they are slaughtered in a manner which very much deteriorates the value of the meat, and a transaction of that kind upon a cargo of 300 beasts would no doubt lose the consignor something like 500*l.*

1923. Do you know whether there is any great movement of cattle in this country from one part to another, and what causes occasion it?—I cannot state.

1924. Do you know at what season of the year lean cattle are sent down?—In Norfolk of course there is a very large demand for lean cattle from the end of August till the end of the year.

1925. And in other counties?—In Lincolnshire, Leicestershire, and Warwickshire, the demand would be in the month of April. In one part of the country they are bought for grazing, and in the other part of the country they are bought for fattening; in Norfolk they are bought for fattening; in Leicestershire and the other counties they are bought for grazing.

1926. Is there any remedy which you can suggest to us?—No, I know of none. The only point which I see which can be carried out is to have a complete separation of fat stock markets and poor stock markets.

1927. When you had separated them, what would you do?—I would provide that the cattle intended for grazing or feeding should not come into contact with cattle which had come for slaughtering, because it generally appears with all these complaints that fat cattle are more subject to them than lean ones.

1928. What do you mean by "store" with regard to cattle?—Cattle intended for further grazing or feeding.

1929. As opposed to fattening?—Yes.

1930. Not fat cattle, and not cattle intended to be slaughtered?—Just so.

1931. (*Dr. Jones.*) What per-centage of loss had you on those cattle which you had in quarantine at Thames Haven?—It was a small cargo; there were 37 head of cattle, and 180 sheep, and I believe that they lost about 200*l.*

1932. What per-centage do you suppose that was of the value of the cattle; what did they deteriorate by those ten days' quarantine?—I should think about 20 per cent.

1933. (*Professor Spooner.*) Are you aware whether any cattle from the steppes of Russia have reached the English market?—I am not aware; I should think that it is not likely; if they have done so it has been after a period of many months from the time when they left the steppes.

1934. Would you be able to distinguish cattle from the steppes from other oxen?—That I cannot say; a certain breed occasionally comes to the market, a grey animal, and we understand that that is a breed which comes from Podolia; but these cattle do not come directly from Podolia to this country; they are driven first from Podolia to Hungary or Bohemia or Poland, and there they are fattened, and thence they come here.

1935. Are there not stringent measures of inspection instituted in those countries through which they travel?—Very severe; it is hardly possible that a diseased animal should come, and I might remark that although it has been proved that these animals have been a possible cause of the outbreak here, there has never been one detected in this country, there has never been a case of the disease in these cattle on their arrival.

1936. You have spoken of cattle being transported from this country to Holland, and conveying the disease there?—Yes.

1937. Those were foreign cattle, were they not?—They were cattle consigned to a salesman, there were 23 of them. The trade had been good, and a speculator, I believe, had bought them; he had bought them dear, and he sent word to say that they should realize 19*l.* 10*s.* apiece here. The salesman could only get 13*l.* 10*s.* for them; and after being exposed for sale on three market days he wrote to his principal for orders, and the orders were to send them back, and they no sooner arrived at Schiedam than they fell ill, and, I believe, that they only realized about 3*l.* 10*s.* there, and they gave the complaint to the cattle right and left.

1938. They were foreign cattle?—Yes; Dutch.

1939. They had been of course subjected to inspection before they were landed in England?—Certainly; there is no doubt that when they came here they were perfectly sound, but after being in the market for three market days they took the contagion, and carried the complaint home with them.

1940. You have stated to the Commission that the majority of the foreign animals sold in the market are for the purpose of immediate slaughter?—Quite so; at least that is the case this year, with scarcely any exception. There were a few bought for store in the early part of the season, but they unfortunately, having been in the market, took the complaint, and carried it along with them. After that I should not think that they had sold one for that purpose in the last three months.

1941. Are you not aware that the London dairymen have been large purchasers of foreign cows?—Certainly; always of Dutch cows.

1942. Have not those cows generally been purchased by them in the Metropolitan Market?—A very large trade is carried on in Dutch cows at the wharf. The owners of the cows attend there, and the buyers go and buy them at the wharf. I think that more Dutch cows are sold out of the market than in it.

1943. What is usually the condition of those cows at the time of the purchase?—Milch cows of course are almost always poor, or of small value as meat.

1944. Have you not seen a great deal of this disease?—Yes; unfortunately.

1945. What is your opinion with regard to its effects upon foreign cattle as compared with English?—I am not aware that there is any difference. My experience is that during the time of its prevalence cattle of all sorts which came to the Metropolitan Market took it.

1946. (*Mr. Wormald.*) Where were these cattle kept which were not sold. You say that they were in the market on three successive market days?—

Most likely they were kept on a piece of land in the vicinity of the market.

1947. You do not know?—I cannot state for certain.

1948. (*Mr. Read.*) Do you consider this to be a new disease?—I do.

1949. You never saw it before in England?—Never.

1950. Do you believe it to be highly contagious?—Without doubt.

1951. What is your opinion as to its origin?—I have not the least idea, but I believe it to be a complaint which has originated in this country; there is a complete absence of proof of its having come from abroad.

1952. You say that if there is to be a quarantine of foreign stock there ought to be good slaughter-houses built at the port of landing?—Yes.

1953. In that case there would be no very great loss if cattle were slaughtered which were upon the spot?—Not so great as at present.

1954. Store cattle do not now to any great extent go from the Metropolitan Market to the provinces; but do not store sheep go?—Yes; a good many.

1955. If the market is now in a contagious state, do you think that those store sheep would convey the contagion to bullocks?—I suppose that they would, but I do not think that there is any complaint that they have done so.

1956. But you have heard that they do convey the contagion?—Yes.

1957. Have you ever had any cattle come from Russia?—Not direct. I have had cattle, and most likely Russian cattle, which have been fattened in Galicia, but none direct.

1958. I suppose that one reason for there having been no foreign cattle affected with the plague is that they are subject to very sharp inspection?—I am not aware that the plague exists where our cattle come from.

1959. In Holland?—In Holland it has existed of course, but it was taken to Holland from here. I have written to all parts, and nobody has heard of such a thing.

1960. Have you written to Austria?—No.

1961. To Hungary?—No.

1962. Or Russia?—I have had correspondence from Russia, from Revel, and they say that they have not had any complaint there for five years.

1963. Had they not the Cattle Plague in Esthonia last December?—No.

1964. (*Viscount Cranborne.*) I suppose that the reason why you do not get cattle from Russia is because there is no railway accommodation?—There has only been one attempt made, but it did not pay, the cattle were so small and so inferior, and the expense of transit was so great that there was no appearance of profit to result from the trade.

1965. But you get cattle from Galicia?—Yes, but they are larger and better.

1966. You do not therefore anticipate any probability, even when railways are made, of much of a cattle trade from Russia?—I should think not.

1967. Do you know whether there is any effective inspection of cattle upon their entry into Austrian or Prussian dominions from Russia?—I cannot say of my own knowledge, but that such an inspection does exist, and that it is a very severe one, is quite certain.

1968. Even for those cattle which are intended for the through trade, and are not intended to stay in Austria or Prussia?—Certainly.

1969. Is there any sort of quarantine for cattle which are supposed to be affected?—There is one at the Russian frontier of I believe 15 days.

1970. What per-centage of foreign cattle imported before this Rinderpest broke out used to be taken for the purpose of fattening?—It would be an exceedingly rough guess if I were to attempt to say. I should say that in my own trade it would not be more than 10 to 15 per cent.

1971. The remainder were killed?—Yes; we sell a very large quantity of our foreign cattle for the purpose of slaughtering in different parts of the country.

1972. How far into the country does that trade go?—They are bought by buyers from all parts of Kent, also from Birmingham, and in fact from almost all parts. As soon as we receive large consignments the prices fall; it is then said abroad, "The prices "in London are lower," and then we have buyers from all parts.

1973. These are butchers from Birmingham and elsewhere who purchase the cattle in order to slaughter them as soon as they arrive?—Some are butchers and some dealers.

1974. But it is always for the purpose of slaughtering?—Yes.

1975. In the present state of the weather, and in the temperature which we may expect for the next six months, would there be any insuperable difficulty in that meat being sent out dead instead of alive?—No, not much; but I must also add that this trade exists principally in the summer and in the autumn; that is the time when we have our large supplies, and then buyers come for them.

1976. You mean that your supplies would rather fall off as the season gets on?—Yes.

1977. Do you not think that in the present state of the market, and with the prospects before us in England, our supplies are rather likely to increase?—I think that it is very likely that there will be a larger supply from abroad next spring than we have yet had.

1978. Have you at all given your mind to the consideration of whether the stoppage of all movement, except for the purposes of slaughter, would be a practicable measure?—I doubt whether it would. I think not. I think that the only means of checking the complaint is that wherever it exists there shall be a cordon round the place, that wherever the disease is known to exist no animal shall leave those premises until a certain time afterwards; and that in the meantime, if the owner has cattle fit for food, they can be killed, and sent away from his premises as meat; but that wherever the disease is known to exist that place shall be isolated.

1979. I suppose that if the disease existed very largely it would practically amount to the same thing as stopping all movement?—To a certain extent, of course.

1980. For instance, London would have to be isolated to stop it?—That would be hardly possible, but still it would be desirable. At the same time to carry out a law of that kind you must compensate a man who for the general good of the country suffers a pecuniary loss.

1981. The seller or the buyer?—The seller. I mean the farmer, who unfortunately has the complaint break out in his stock. It would be said to him, "Your cattle are diseased or suspected, and you "must not move them;" then he would say, "Are "they to stop here and die?" If they were poor stock they would have no value as meat, therefore he might possibly lose his stock, which would be of a certain value, and it is only fair that he should be paid some remuneration for his loss, as it would be incurred for the good of all.

1982. Would you remunerate him upon all diseased as well as upon all healthy cattle?—Only upon his loss.

1983. Whether the Government interfered or not, he would have some loss by reason of the disease; would you compensate him for that?—Certainly not. I should say that the operation would be this; there are a certain number of cattle which are killed and buried, that is of course a total loss, and he ought for that proceeding to receive a certain amount of compensation, say one half or two thirds. It is all very well to speak to large men, and say, "You can afford "to lose a thousand pounds;" but poor men cannot do so, and they would be ruined. They have there-

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fore no alternative but to send their cattle away, if possible ; and thus the disease has been propagated ; whereas if compensation were paid for the cattle being taken away from them by Act of Parliament they would be better off, and the disease would go no further.

1984. (*Chairman.*) Supposing that all movement of cattle, as some witnesses have suggested, is stopped in the country, do you think that there should be any compensation to owners who have no diseased animals on their farms, and yet send meat to market ?—I should think not.

1985. Only to those who have diseased animals ?—Only to those who have their cattle destroyed.

1986. (*Viscount Cranborne.*) And only then when their cattle are buried ?—When it is a total loss.

1987. (*Dr. Playfair.*) I do not think that you quite understood Lord Cranborne's question, which was, whether you would give compensation to the owners of those animals which died of the disease, or to the owners of healthy animals sold by the order of the inspector to avoid the spread of the disease ?—Undoubtedly to both ; but at the same time where the animals were healthy and to a certain degree fat, so that they had a value, I should give no compensation.

1988. Supposing that a man by his own gross imprudence introduces a diseased cow into his herd, and the rest of his herd became diseased, would you give a premium to that man in the way of Government compensation ?—Certainly not, because you would not in a case of compensation give a man the full value.

1989. Would you give him any compensation ?—Of course, if it could be proved that it occurred by his own imprudence I should give none.

1990. Would not such proof be very difficult ?—I should think it very unlikely that a man would act in that manner.

1991. It has been stated in evidence that in a great many cases persons have done so through imprudence, by not keeping the newly purchased stock separate from the others ?—That might take place ; but compensation would of course only be given under certain conditions.

1992. (*Chairman.*) With regard to sheep, do you import sheep ?—Yes.

1993. What is the number imported into the country ?—I think that the number this year would be about 500,000.

1994. Are they imported for the purpose of selling to the butchers or to the farmers for grazing ?—They are probably merely imported for slaughter, but many of them are of very inferior quality, and are sold for stock.

1995. A larger proportion of the sheep imported are sold to graziers than of cattle ?—At present, most certainly.

1996. You have stated something with regard to quarantine ; do you believe that quarantine at our ports would be practicable ?—Perhaps so, upon a small scale, but it would be impossible universally ; and I may remark that the keeping of large quantities of cattle together, if the disease exists, would only give that disease in a much stronger dose. There are arriving from Tonning to-day and to-morrow at least 2,000 beasts. If there is a case there which should lead to suspicion, they must all stop, and there is not room for half the number.

1997. You have stated a case where you believe that the disease has been sent to Holland by cattle which have come over to this market, and have been returned to Holland ; is it often the case that cattle are returned ?—It is very rare.

1998. Why were those cattle returned ?—It was an act which showed a very great want of judgment. The man who had them for sale could only make a return which would bring his principal a heavy loss, and therefore he sent them back, but by so doing he acted very imprudently.

1999. (*Mr. Read.*) Did you ever hear of such a case before ?—Very rarely before ; perhaps not above two or three times in all my experience.

2000. (*Dr. Parkes.*) I suppose that you are acquainted with the arrangements for the transport of cattle, and the treatment of cattle on board the vessels ?—Certainly.

2001. What is the condition of the vessels ; what arrangements are made for the proper transport of the cattle ?—Of late the vessels have been exceedingly improved. When this trade first began the ships were small and badly ventilated ; they now carry a large number of cattle, and are well ventilated. The ships now carry from 300 to 500 head of cattle each, besides the sheep, and they take a certain amount of hay and water, and they convey a certain number of men, according to the size of the ship ; and it is their business to see that the cattle are supplied with water and food on the voyage.

2002. Is that fixed by regulation ?—No.

2003. It remains with the owners ?—Yes.

2004. Is the management the same on board all the vessels ?—Pretty much the same.

2005. How often do the animals receive water ?—Morning and evening.

2006. Do the men at all clean out between decks ?—Not on the voyage.

2007. Are there any special means of ventilation ?—They have hatches, and they have also what they call wind-sails.

2008. But nothing more than that ?—Nothing more than that.

2009. Do they use, or did they use before the occurrence of this disease, disinfectants of any kind ?—Very rarely.

2010. Do they now use them ?—Yes.

2011. What do they use ?—I believe that they principally use chloride of lime.

2012. How many cattle are taken in a ship ? Do they take them according to the tonnage ?—According to the measurement.

2013. Is there any rule in that respect as to the space given to cattle ?—None.

2014. Are they placed as close together as they can be ?—Yes.

2015. They are tied by the head ?—Yes ; to a certain extent the cattle are better when they stand close than when they stand loose.

2016. On account of the movement of the ship ?—Yes.

2017. During a two or three days' voyage do they at all fall off in condition ?—Not much ; but during a bad voyage they suffer exceedingly from the motion of the ship, and they are knocked about from side to side occasionally, and they become badly bruised.

2018. Is there any inspection of these vessels when they arrive, as to the number of beasts which have been brought, and their treatment during the voyage ?—No.

2019. It is entirely left to the importers or the owners of the vessel ?—Entirely.

2020. Is it your opinion that that trade is now conducted on good principles and in a good manner, or the reverse ?—I think that it is conducted very fairly ; I think that occasionally the ship is too full ; for instance, during a long voyage, when the weather is bad, and there are too many cattle down in the hold, the heat is such that the cattle are overpowered, and there is no doubt that if they were not quite so thick they would get through the voyage far better.

2021. Does that often occur ?—Occasionally ; for instance, I received some cattle from Holland yesterday ; 18 were put into a compartment where there was only room for 14 ; out of those 18 two died, or, rather, one came out of the ship dead, and the other had to be killed in consequence of exhaustion. I cannot say what ship they came by.

2022. Do you consider that inspection and regulation as to the amount of cattle which a certain vessel is capable of carrying would be a good measure ?—Exceedingly good.

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2023. And regulations as to the amount of water and hay ?—Certainly.

2024. It is, I suppose, the interest of the importer to take every possible precaution ?—Undoubtedly. It is the interest of the steam-ship proprietor to get all that he can, but it is the interest of the owner that no more animals shall be put on to the vessel than it can carry.

2025. (*Mr. Read.*) Do you think that a system of mutual insurance societies would be preferable to Government compensation ?—Upon that point I can give no opinion, provided that owners are compensated for their cattle.

2026. Whether that is by mutual insurance companies or by the Government ?—I think that it would have more effect and more power as a Government measure, because I think that in cases of mutual insurance in small districts, in case of the outbreak of disease, to a certain extent they would be all losers, and there would be no payers.

2027. You would not call a small insurance company one which comprised a county ?—Certainly not.

2028. (*Chairman.*) Is there anything further to which you wish to draw the attention of the Commission ?—I think not.

2029. (*Mr. Wormald.*) Has the quality and condition of the cattle imported for slaughter much improved ?—That I can hardly say. This year we have had a very bad season, and therefore our cattle have come to hand in an inferior condition ; last year they were far better.

2030. (*Mr. Read.*) When you speak of a bad season, I suppose you mean that foreign cattle are principally summer grazed ?—Yes.

The witness withdrew.

Mr. Hermann Gebhardt examined.

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2031. (*Chairman.*) I believe that you are a large importer of foreign cattle ?—I am a salesman.

2032. Do you purchase foreign cattle on your own account, or are they only consigned to you ?—I never purchase ; they are all consigned to me.

2033. Can you state the number of foreign cattle which you usually import into England?—I should say about 400 a week on the average ; because sometimes in the season we import more and sometimes less ; and I sell a great many sheep. I should say that I sell about 2,000 a week.

2034. Are they all foreign ?—Yes. I sell nothing but foreign cattle.

2035. Taking the horned cattle, from what ports do they mostly come ?—In a certain time of the year, for instance, from July up to the end of November, the majority of them come from Schleswig, Holstein, Oldenburg, and Holland. From Spain I get them all the year round. From Vigo and Corunna they come every week at all times of the year. From the beginning of December up to about the middle of August they came more from the southern parts of Germany, being shipped by way of Hamburg, Rotterdam, and Antwerp. They come from as far as Hungary. Last week I had some from Galicia, from Lemburg. The principal part of my cattle come from Magdeburg, Berlin, and that district. So again, from the Rhine, they come from Wirtemberg, from Baden, and from Bavaria, and as far as Cologne upon the Rhine.

2036. Has the trade in foreign cattle increased very largely of late years ?—Very much, indeed ; it is increasing, I believe, every day ; in fact there is hardly sufficient accommodation to bring the animals over here, and the different steamboat companies can hardly now bring them, although there is more accommodation than there was some years ago.

2037. From whom are they consigned abroad to you ?—The trade in the northern countries, such as Schleswig-Holstein, is generally direct ; the grazier sends his own cattle, so that we get them in lots ; one man sends one bullock, or perhaps the larger graziers send 10 or 20. The other trade in Magdeburg and Berlin, and so on, is carried on by jobbers ; they send the animals in large lots. The Spanish trade, which come to about 100 animals a week, is carried on by one firm in London ; they are bought in Spain.

2038. By what route do the Hungarian cattle come to you ?—The majority of them, I believe, come by way of Bavaria to Mayence, and up the Rhine, but some come by way of Hamburg. I do not think that so many come by way of Hamburg as the other way ; we get the Podolian and Galician beasts by way of Hamburg. Of Russian beasts, we have had none, except one cargo. I have made it a matter of special inquiry, and there has never been a Russian bullock in Hamburg for the last ten years. It was gravely stated by Professor Gamgee when the disease first broke out, that week after week Russian cattle found their way to this country by way of Hamburg ; but I can state upon authority that that is false, there has been only one lot arrived about 10 years ago, from Russia, excluding this last cargo, and they were so very bad they hardly could be sold, and they never sent any more.

2039. What is your authority for that statement ?—I have it from the largest salesman in Hamburg, who knows that no other animals came but these particular ones, and that they were so bad that no others did come ; he is a man well known, I believe, all over the continent.

2040. Have you any information as to the countries where the plague exists ?—No ; I had a gentleman here last week from Lemburg in Galicia, and I asked him whether they had had this Rinderpest in that country, and he said, yes, that they had had it in former years, and very severely; but that for the last three years in the whole district he had not heard of one single case. He gave me some information as regards the treatment there.

2041. With regard to Hungary is there any disease there now ?—No ; they have none in any of those parts from which I receive cattle, because I made it my business to write to a gentleman who was then staying in Vienna, and who was sending to me 1,000 sheep a week, and about 50 beasts a week. When the disease broke out I was afraid that perhaps these beasts might be stopped, and I advised him not to buy any more, as the public feeling was very much against foreign beasts.

2042. (*Dr. Playfair.*) To what part of Hungary do you allude ?—I cannot say, because the correspondence always comes to me from Vienna.

2043. (*Chairman.*) Has Hungary, in your belief, been free from the disease for some months past?—Yes. As far as I can learn, they have had none there this year for a certainty ; as to former years I cannot say ; but this year there have been large consignments ; and as I have said in the part where this gentleman was buying his cattle they were quite free.

2044. You receive cattle from Holland, do you not ?—Yes ; I receive a great many from Holland ; but they are not Dutch cattle ; they are shipped by way of Rotterdam, but they come from the places which I have stated before, Magdeburg and other places.

2045. There is a great deal of disease in Holland now ?—Yes.

2046. All these cattle from the south of Holland and Germany pass through the infected districts before they embark ?—I do not know that they do ; I believe that the place where the disease is is in a different part. I am told that the district is quite

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excluded from any traffic, and that they will not allow the animals to come out.

2047. That is as to through traffic?—I believe that where the railway comes is not at all near the place where the disease is.

2048. Can you state what regulations are in force in Hungary, Prussia, and Holland with regard to cattle exported to other countries, in order to detect disease; are there any inspections?—I cannot say much about that matter, except what I heard from a gentleman last week; he said that the moment that the disease broke out in their district, the place was totally surrounded, by order of Government, with police or soldiers, and that the diseased cattle were taken away from the others, and immediately killed and buried. The Government compensate the owner for the cattle which they order to be destroyed, about two-thirds of their value. As regarded the sound cattle, they tried as much as they could to separate them as far as possible, and supposing that a man had 100 beasts, and had not room enough to give them all a separate stall, he would actually drive posts in the field, and tie them all apart at a distance perhaps of 100 yards, to get them as far apart as he possibly could.

2049. Do you not think it possible that animals should reach this country from an infected district abroad?—I do not think it possible. I believe that it takes the cattle from Hungary 12 days to come from there. I have got this from the drover himself. Of course you know that we can travel much quicker to Hungary, but these cattle trains do not go right on; there are delays from one country to another. For instance, the cattle which came from Galicia had the greatest trouble in the world to pass the Prussian frontier; they wanted to unload them, and this gentleman told me that he had a wonderful deal of trouble before he could get through with them. I believe that they were the first cattle which came from that part.

2050. What caused the trouble; was it occasioned by any regulations of the Government?—It is the police regulations. These animals came from Galicia, and they had to pass the Prussian frontier; and the gentleman said that he had a great deal of trouble before he could get them passed; not that they refused to let them in, but that there was a great deal of difficulty and delay. I had cattle here from Hungary, and the drover said that they were 12 days coming; it was at the time when the disease broke out, and Professor Simonds came to me in the market, strongly impressed with the idea that the Hungarian cattle were affected; they used to call Hungarian beasts also Russian, and if anybody saw a white bullock he thought that it was Russian. Professor Simonds asked me where the beasts came from, and I said that they were Hungarian beasts. He was afraid that some of those beasts might have brought the disease. I had sold in the previous week 50 of these beasts to two gentlemen in Bristol at 25*l.* a piece; they came early to me in the morning, and said, "Have you any more of those white beasts?" I said, "I have no more, but shall have some next week." They said, "Will you give us the refusal if you have some?" I said, "Why?" They said, "Because they are as fat as we have ever seen." This was the Monday following. The others were in a field, and are doing as well as could be. The beasts were 12 days coming, and were two days at my farm, making 14 days; and this gentleman had them the week afterwards in Bristol, and killed them the following week, so that is more than three weeks; he has sent them regularly every week.

2051. As regards the animals which are imported from abroad, do you sell many of them for grazing?—Very rarely; I should fancy that I do not sell 100 beasts a year for grazing; I might almost say hardly any.

2052. You have told us about the inspection abroad; is there any strict inspection at the ports where the cattle land in England?—It is very severe; it has always been severe; but they are now still severer. They will take a whole cargo, open the mouth of every bullock, and lead him out singly. In fact there are men now inspecting cattle who are not fit to be inspectors. I may mention a case. I farm a good deal of land, besides being a salesman, which is necessary for my business. I have a herd of very valuable stock at Muswell Hill about four miles from London; they are pedigree stock. They have now an inspector there, who is a shoemaker at Highgate; another man is a publican. These men are appointed inspectors, with unlimited power, and I actually gave my man orders if they came to my place to use force, and not to let them on the place. I have been many years in the trade, and have had no disease, but I am not certain that they would not bring it in, and they might order animals to be condemned which had no signs of the disease. I was unfortunate, one of my pedigree cows knocked her hip-bone off, and she is now lame; and if this man came he very likely would say that she was diseased, and would order the whole lot to be killed.

2053. Who appoints these inspectors?—The magistrates.

2054. The magistrates of what petty sessional division?—The magistrates of Highgate. This man is a shoemaker, and is a tax collector. It is a great shame that such things should be allowed. All the people around me have valuable stock, and we cannot tell what mischief such a person may do.

2055. Have these people no veterinary experience or knowledge whatever?—This man has been a shoemaker all his life, and they made him tax collector, and he collects the poor rates. He knows no more about disease, I believe, than a child does.

2056. Has there been much disease in the district?—Yes; he condemned in the case of one man 27 cows, and I believe that the man is going to law with him; that is the only case that I know of.

2057. That has reference to local inspection?—Yes.

2058. But we were speaking of inspection at the port?—They are very rigid and severe.

2059. Are they equally rigid at all the ports?—Yes, I believe so. The other day they detained a cargo in Harwich, and they said that that cargo had the Rinderpest, and they killed a lot, and after some of the beasts had been there a fortnight they had to give them up again, and a lot of them were killed on suspicion; but we have no remedy. We will say, for argument sake, that the inspector of the wharf says that one animal has the disease, and that all must be detained. I say, "If we keep this animal "for some time will you give them up?" He says, "I perhaps will give them up in a week again." Then we know that there is a certain loss, and we will not risk it, and we have them killed. If they have not the disease they have a very great chance of getting it, these wharves being very dirty places, and therefore we take the remedy at once, and have them killed at a great sacrifice. I think that 280 animals were all slaughtered at Blackwall, and there was actually only one cow amongst the lot which had the disease, for it was proved that the other animals never had it. Another cargo of cattle was detained a fortnight on suspicion, and then given up as sound animals.

2060. Where did these animals come from?—They were shipped at Rotterdam; but of course there were a variety of cattle, perhaps some from Germany and some from Holland.

2061. One cow had the Rinderpest, and the others, though in the same ship, did not take it?—Yes. Of the cattle at Blackwall some were not killed for nine days, because the weather was so hot, and they had so little room that they could only kill 40 animals per day, and they were there for nine days with no sign of disease.

2062. Where were they placed during those nine days?—In a very bad place; they were all the time under a broiling hot sun, and they could not allow

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them to be on the wharf on account of other steamers unloading their cargoes every day. This is such a great grievance that if such things happen there should be proper wharves or slaughter-houses provided where they can be taken to, because the other cattle land every day, and there is nothing but a partition between them to divide the supposed healthy ones from the supposed diseased ones.

2063. Your attention has been drawn to the Order in Council which has been lately issued restricting the sending of animals to the Metropolitan Market except for the purposes of slaughter?—Yes.

2064. What is your opinion with regard to that?—I don't see how it can be well carried out. I have not read it very particularly. I think that you might prevent cattle being sold for keeping, but you cannot order that all the cattle shall be killed in London, because a great many go out again from London; and therefore they have applied the remedy of cutting the hair off their tails, which shows that they are not intended for killing.

2065. Do you suppose that cattle with this mark upon them are sent for the purposes of grazing?—None this year. Last year a great many which came from Holland, young beasts, 12 or 18 months old, were sent over here for grazing, but I am not in that trade.

2066. Are not animals which are marked in this way often sold for grazing instead of slaughtering?—I do not believe that under the present circumstances they would be, because I do not believe that at the present moment any person would buy them.

2067. Supposing that this order was vigorously carried out, would it have an effect upon the foreign trade?—I do not think that it would at all; as long as they do not compel us to kill the beasts in London, and they have to go to some place to be slaughtered, it does not matter.

2068. Suppose that there was an order to kill them in London, and that no animal was to leave London alive?—It would be very injurious, and I do not see how it could be carried out, because even the Government will not take the supplies in any other way than alive, at Aldershot, Portsmouth, and Plymouth; they all must be sent alive. The supplies are chiefly foreign beasts, because they are cheaper, though they are good beasts; the prices of the contract would not allow the contractors to buy the best English beasts.

2069. Would it not be possible for them to have the beasts slaughtered in London, and to have the meat sent down as wanted?—Yes; but the Government will not take it so.

2070. But the Government might alter its system?—It could not be done in summer, it would be spoilt before it got there.

2071. But in the next six months it might be practicable?—It might perhaps do in cold weather. I wish to mention one other point: many thousands of beasts go into the country which are bought by private butchers. I should fancy that one third of our supply in the Metropolitan Market goes out again for killing.

2072. And the animals are not killed for some days?—That depends upon circumstances. I believe that it is generally supposed that the butcher provides himself from one week to another, and kills his beasts as soon as he can, because the longer they are kept on hand the more they waste.

2073. It has been suggested by some witnesses as a means of stopping this disorder in England that all movement of cattle in England should be stopped, and that animals should be slaughtered where they are grazed; what have you to say to that suggestion?—I do not see how it is possible to be done; I think that it is totally impossible.

2074. Supposing that it was thoroughly carried out, and that foreign cattle had to be slaughtered at the port where they arrived in England, would it stop the trade to any great extent?—Yes; in fact you might just as well prohibit importation altogether, because the sacrifice would be so great that the people would not send the meat; we now get these large supplies, because we make more money of them than they do in Paris. I am now selling at least 2,000 or 3,000 sheep a week. The moment you made such restrictions the meat would be worth so little money that the animals would not come. I do not see any good in preventing the movement of cattle; the only good that I can see is by preventing their being moved when disease breaks out, but what is the use of preventing sound cattle being moved about?

2075. With regard to sheep you import very largely?—Yes; I sell a great many.

2076. Are there any facts with regard to the trade in sheep which you wish to state to the Commission?—No; we have had nothing with the sheep. Some years ago there was the small-pox, but of late years I do not know that I have had one sheep detained, except it has been injured on the journey.

2077. Where do your sheep come from?—They came from all the parts which I have mentioned before, but I think that the majority of them came from Baden, Wurtemberg, Bavaria, and Magdeburg.

2078. What would be the effect of stopping all the fairs and markets in the country?—I do not think that it would be such a wonderful thing. You are alluding to store animals, I suppose?

2079. Yes?—I do not think that it would have such a great effect, because, as far as I can learn every farmer is almost frightened to buy them in a fair. I think that they would rather buy them in the homesteads, one farmer from another, than to go to a fair. I believe that now a cargo of cattle is coming from Schleswig-Holstein, all store cattle, and, I am told, all intended to be sold in Norfolk by two Englishmen who went over there and bought them; but I am told that they do not intend to bring them into the market, but to bring them directly to the farmers when they land them.

2080. What would be the effect of stopping the country market as regards fat animals for the butcher?—I think that they might stop the country market sooner than they might stop the town market in large places; because, if you leave such markets as London, and Liverpool, and Birmingham in existence, butchers might get supplied in smaller places from the country. In fact Birmingham is to a great extent supplied from the London market.

2081. You have thought a good deal about this Rinderpest in England?—I have.

2082. Have you formed any opinion as to how it should be got rid of in the country?—No; and I think that no other man can. My belief is that the only way to prevent its spread is, that when it appears people should not be allowed to take the animals away, or move them. Whether it can be cured I do not know; but the universal practice abroad is to kill them there and then when the disease breaks out, and I believe that, in the long run, it is the safest. Government always compensates the owner. If they kill those which get the disease it may perhaps save the others. The gentleman whom I have referred to told me that directly the disease shows itself they take the cattle out of doors, and tie them about 100 yards apart to give them fresh air, and keep them separate as much as they can.

2083. Have you formed any opinion as to the origin of the disease?—I am quite of opinion that it is not imported. I think that it is a disease like cholera, or any other disease which is in the air; and I am in hopes, and believe, that when we get cold weather, it will leave us as it has done in other countries.

2084. Have you any evidence that when cold weather has come on the disease has disappeared in other countries?—I have had the evidence of a gentleman for whom I sold beasts last week. He told me that it was generally the case that they got it in hot weather, and that when the weather became cold it left them, although he had known it to break out in cold weather, but that generally

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when the disease came in the summer it diminished and disappeared altogether when the cold weather came.

2085. You have given us rather a forcible illustration of the manner in which Government inspection is carried on in a district where you have a farm; have you any other case to illustrate the working of the system now in force in the country?—No; I have only one remark to make, which is, that power is now given to inspectors which ought not to be given. On Monday I had 40 or 50 beasts by train from Thames Haven; one cow broke up and split her haunches. She was killed, an inspector from the Islington vestry went and condemned her, she was as sound as ever was seen, but only was broken in her hind quarters. The market inspector said that she was sound and fit for human food; the Newgate Market inspector did the same. I then demanded the animal of the party who had condemned her, but it was of no use. He showed me the order of the magistrate, and she was taken away, and was destroyed at a loss of 20*l.* The magistrate had never seen the animal, but some inspector, nobody knew who he was, condemned her.

2086. Was that an inspector appointed by the Privy Council?—No; it was one of the parish inspectors. They go before a magistrate, and the magistrate has never seen the animal; in fact I was advised that the magistrate ought to have seen the meat, but the magistrate never saw it; it was merely that this party came to him and said, "Here is an "animal not fit for human food," and he gave an order for it to be destroyed.

2087. Is that inspector a veterinary surgeon?—I do not know him, but he showed me a paper giving him power. He said, "If you oppose the removal of "this beast you do it at your own peril; if you do "not let it go I shall bring two policemen, and if "you have any men here to prevent me I shall bring "40, and you will bring yourself into trouble," and so I was obliged to let it go.

2088. What becomes of the meat?—It goes to the knackers, and they put some stuff on it to destroy it.

2089. (*Mr. Read.*) You call this disease the Rinderpest. Why?—I do not call it the Rinderpest, and I do not know that it is the Rinderpest, and I have very great doubts whether anybody in this country knows that it is the Rinderpest.

2090. Did you ever see it in England before?—No.

2091. It is quite a new disease?—Yes, I never saw it abroad.

2092. Did you ever see the Rinderpest abroad?—No; never.

2093. This is a highly contagious disorder?—I believe that it is very contagious.

2094. You say that no store cattle go out of the Metropolitan Market now to be grazed; sheep do, I suppose?—Yes, they do. I do not think that any men would buy cattle for that purpose at present; I do not hear that anybody buys them; I do not believe that any one would be fool enough to do it.

2095. Why do you say that a man would not be fool enough to do it?—Because we have had this disease in the market, which has been brought there from the London dairies, the hotbed of all diseases among cows. The moment the London dairymen had a diseased cow they sent some others which were not diseased with the diseased one to the market, and there is no doubt that we had the disease in the market to a very great extent. The authorities have cleared the market now, and have done all that they could, but it is quite certain that some diseased animals do come in every day.

2096. The Government contractors do not buy the foreign stock from their supreme healthiness, but from their comparative cheapness?—Yes; they get more weight for money; it is good sound beef, but it is not so good as our best English beasts; the animals are more bony, and there is more weight for money.

2097. They are not so thick in flesh?—No.

2098. Would you not recommend that proper slaughter-houses should be erected at the outports, in case any more of these cattle should be detained?—Yes; each outport has a slaughter-house, but it is not at all sufficient for such a calamity. All steamers should be examined by Government inspectors, to see whether they are fit to carry cattle, and not be allowed to carry more than a certain number, according to the size of the ship. A great many sheep and beasts are killed by overloading and want of ventilation.

2099. You do not think that stopping the store markets and fairs throughout the kingdom for two or three months would be injurious?—I think not, because if a man wanted cattle, I believe that he would just as soon go to a private place as to a fair. I believe that Barnet Fair has done a great deal of mischief.

2100. But you do think that the stoppage of all cattle trade would be exceedingly injurious?—Yes; I think so.

2101. (*Dr. Playfair.*) Are you aware that after the year 1744 there were 12 successive winters and cold weather without the disease being stopped?—Yes; I have read it in the papers.

2102. Then do you take the encouraging view of the matter that this winter will certainly stop this disease?—No; I say that I hope that the disease will go, as it has done in foreign countries before.

2103. But it did not do so in fact after 1744?—It did not.

2104. (*Chairman.*) Have you anything else to which you wish to call the attention of the Commission?—No.

The witness withdrew.

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Mr. Henry Hicks and Mr. James Brewster examined.

2105. (*Viscount Cranborne.*) (*To Mr. Hicks.*) What are you by profession?—A cattle salesman.

2106. Do you import largely? No; mine is the home trade entirely.

2107. Then you import no cattle at all?—None whatever.

2108. To what extent do you sell cattle in the Metropolitan Market every week?—150 to 300 a week.

2109. From what districts do your principal supplies come?—Principally from the east of England and Scotland, and from Ireland.

2110. Have you had many diseased beasts?—Very few.

2111. Has the number of animals supplied to you much diminished during the last few months?—Yes; from Ireland considerably.

2112. But not from other parts of the country?—Yes, from other parts of the country, because it is not the season. From Christmas up to July is what we call the winter grazing season; turnip grazing, which is the Scotch and Norfolk system.

2113. Are the mass of the animals which are sold lean or fat?—Fat.

2114. Were they so before this Rinderpest broke out?—Yes.

2115. You did not sell many to graziers?—No; very few.

2116. Where did those cattle which were sold to graziers come from?—They would be any cattle perhaps not sufficiently fat for the butchers.

2117. Do you know much of the movement of cattle from the countries where they are reared lean?—A good deal.

2118. At what period of the year are they principally sent into the market?—Do you allude to the Metropolitan Market?

2119. Yes?—That is principally a fat stock market; not many are sent there regularly, but merely by chance.

2120. Can you form any approximate idea of the per-centage of those sold for slaughter and those sold for grass?—I do not think that I can; but at the present time a very large per-centage leaves London and goes into the country, for the supply of the country trade for slaughter.

2121. With their tails cut?—No, without; but an order has been issued that they shall all be cut, which is a step in the right direction, for the purpose for which it is intended.

2122. I conclude that you think that that step might be carried a little further?—I think that a great many steps require to be carried a little further in order to be of any use at all in effecting the object which we have in view.

2123. What would you recommend?—My recommendation would be a quarantine for instance; pure isolation where the Rinderpest has broken out; isolation in every sense of the word; without that you will do nothing.

2124. That involves I presume enabling inspectors to prevent the movement of cattle; or do you mean only to prevent the movement of infected cattle?—Certainly of the infected cattle; for instance, that there should be a law that if a farmer finds that the Rinderpest has broken out amongst his stock they must all be isolated. I do not say but that in the early stage the cattle may be saleable and useable, and not injurious to a human being to eat, but it must be in the very early stage, before the disease has discoloured the beef, which it does. After the cattle have had the Rinderpest for a short time you will find the carcase of the animal a foxy colour, as if it had been scorched, and I should not like to use it.

2125. Do you think that the farmers generally, with a prospect of isolation before them, would voluntarily report that they had Rinderpest?—Then you have the other way of meeting it, namely, to make men know that it is their interest to be honest, and until you make men feel that, you cannot do much, because they will naturally keep secret their troubles.

2126. How can you exert that influence?—By making them know that there is a compensation. I see no other plan.

2127. Would you give compensation for all healthy animals killed?—For all animals destroyed. By that means when a farmer finds himself in trouble he will immediately make his troubles known, because he will feel that it will establish his claim better. On the other hand, when a farmer finds himself in trouble by finding two or three of his cattle diseased his first care is to get rid of all the rest. He will not immolate himself upon the altar of his country, and allow himself to be a ruined man. The difficulty is that the most scientific man cannot point out the disease before it is evident; it is very subtle, and it will remain in abeyance for many days, and although the animals may appear sound when they come into my hands, and I believe them to be sound, they may not be so; they may have the disease incubating in them, which after they have parted from me will break out elsewhere; and that is where we find the greatest trouble at the present time. Many of the London cows and others which have been infected, and which do not at first show the disease, find their way into our market, and are sold quickly, because they are wanted to be turned into money. Some men hover round these animals like birds of prey round carrion, because they buy them cheaper, and then they carry them away into the country, particularly to Birmingham and those places, and they have infected everything which they have come across.

2128. Supposing that Government were to forbid that practice, and to say that cattle entering into any fair or market must be slaughtered immediately, and only exported dead, what would be the effect?—Then you would divide the supply and the demand, and you would destroy the trade, for they cannot exist apart. I should think that 2,000 cattle a week are taken out of London; both the buyers of those cattle and other parties would be sacrificed.

2129. Might not buyers buy them dead?—They perhaps do not require them dead immediately. They buy them perhaps once or twice a week, and in warm weather particularly the offal would come to a very bad account, and so would the beasts. In fact it would not do.

2130. Might it not do in cold weather?—I think not. I think that it would be impracticable. I have seen a good deal of it for many years. There is another point under the orders as to the traffic of cattle through the streets. Now it is not well for us to stop the traffic through the streets; but there is no doubt that the Metropolitan Market has been the great source of the disease, and particularly in its lairs. According to the law, if the beasts cannot get out of the market before a certain hour of the day they are not allowed to travel through the streets before seven in the evening. The consequence is that nearly all the cattle after they leave the market are put into these lairs. They could not be put into a worse place, because many of these beasts are bought by the trade to stand four or five days before they are killed; many are high-priced beasts. They go into the lairs, where they have the best chance possible to catch the disease. If the law were that no cattle after being sold should be allowed to go into those lairs, but should be driven straight away from the market, it would make their chance of catching the disease less, and I think that a very important point. There is another point to which I should like to draw the attention of the Commission. When the cattle arrive at the wharves, if the medical inspector finds that two or three out of a shipload of 100 or 200 appear to be infected with the complaint, the whole lot is stopped; and there has been a case lately where they have been stopped a fortnight. They may be perfectly free or not; but, if they are not free, there is every opportunity for the disease to break out in all its virulence, and by that means this horrible contagion may be propagated. If cattle have it about them by any chance, or if any portion of them have it, the sooner they are killed the better, and the more likely they are to be useable for the food of man. Therefore, if cattle are to be at all stopped through quarantine it is much better that there should be a proper place for them to be taken to; and that they should be immediately sold for slaughter by the salesman to whom they are consigned, and got rid of at once, because the longer you keep them the worse it is if they have the disease, and if not, see the injury which it does. I have had a long experience of cattle; and I should say that the depreciation of cattle in London is at least 5*s.* a day each, and sometimes more; and then there is an expense attending it, which is of importance.

2131. Then would you recommend that they should all be slaughtered at the port of landing?—I should not recommend it, unless they are decidedly diseased cattle. I have heard of great hardships where cattle have been detained, and there has been no disease at all.

2132. You are speaking of foreign cattle?—I am. They detain cattle upon suspicion, and after being there a long time they say, "It is all right, take them "away;" but mischief is done in that time. I have known cattle to lose 4*l.* and 5*l.* a-piece in consequence of detention. But even supposing that the medical adviser was correct in his opinion, the cattle would be worse, and the disease much more virulent than it otherwise would be.

2133. In fact you think that quarantines are impracticable?—I think that they are very injurious, because they would let the disease catch the healthy cattle, and would depreciate the value of them, and

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it would have much more power. They should be under supervision, but they should be immediately slaughtered and killed for use. They may be useable then, but I think that when the beef is so far marked that it changes its general nature; it is very doubtful.

2134. Do you not think that many cattle are infected and carried away from the port of landing or the market to the butcher, and kept there three or four days before they are killed, and that they are very likely to communicate the infection?—There can be no infection unless they are mixed with others.

2135. Have not the butchers generally other beasts?—Not in London.

2136. I am speaking of the country?—I could not give an opinion upon that point, but I should say that whenever they come into contact with other cattle it is almost similar to the case of a man being on fire and running out to some one else, and putting him on fire. If the cattle are allowed to mix with others they never will be free from the disease. There have been cases at Aylesbury this week, which hitherto had been free from the disease, and it has been given right and left to the poor people's cows.

2137. Have you had any opportunity of forming an opinion upon the efficiency of the inspectors?—That is a very serious question. The country cannot produce what is required; it requires practical men, and you have not them. I was a member of the committee of the corporation, but I resigned my position; I saw so much which I did not choose to make myself liable for, that I resigned; they appointed men who were not practical.

2138. What sort of men?—Veterinary surgeons who knew no more about the disease of the cattle than the dealers.

2139. But did they always appoint even veterinary surgeons?—I only had to do with the two inspectors in the city; but I consider that the committee broke down from want of power.

2140. (*To Mr. Brewster.*) Do you generally agree with the evidence which Mr. Hicks has been giving?—Yes; generally, except so far as regards the whole of the cattle being killed; and I do not agree with Mr. Hicks when he speaks of the disease as being contagious. My business chiefly lies with sheep; but I have studied this question since the disease first broke out, and have seen it, and the contagion is not so great in our cattle market as has been generally considered, and as I think Mr. Hicks believes. That is where I differ from him, because I have known several cases. Few animals would be more likely to suffer from the disease, than animals in the cattle market, and many have escaped. I can speak of a case where two cows have been in close proximity in the cattle market the whole time that this Cattle Plague has been in existence in England, and they are at present free from the disease; they are in a field adjoining to the market, part of what is called the market area.

2141. Where were they bred?—They are English cows. There is another case: I went this morning to a cowshed; there are certain routes laid down for cattle to go to our market; there is a route laid down from the east end of the town, where a great many cattle come from, and which have been diseased; but those cows are perfectly healthy, and I know that they have been in close proximity to diseased cattle from our market, which have not taken the disease with them.

2142. On the other hand, do you not think that an enormous amount of disease has been propagated by contagion?—I am quite certain that it is propagated by contagion.

2143. But you think that the contagion is not certain to take effect upon every animal?—Yes; and even in the cowsheds of London, where they have tried to treat it—I believe that it is quite possible to be cured, and there they have succeeded. A large proportion of the cows have been left in the sheds perfectly cured, and some have been free from the disease the whole time.

2144. Have you any instances of cure to mention to the Commissioners?—Not many, because my attention was devoted to it first of all; but when the committee was appointed in the city, it was intended to go fully into the matter by taking cows and having them treated by proper medical men (but from one cause or another that was not carried out), and I did not carry out my views, or I should have been very glad to have tried it. I believe that it is absolutely necessary, in order for you to learn the nature of the disease. I believe that it is perfectly curable, and I have found it so in several instances, and I believe that it is not so virulent as has been represented. I do not believe that the loss from the disease itself up to the present time has been so great as the loss by pleuro-pneumonia among the cattle either in London or in the country, but so much noise has been made about it that attention has been more drawn to it. I will grant that it is a most serious thing, for people have been so frightened that they have sent their stock away, and they have had it killed without any necessity for it.

2145. Have you not heard of cases where very large portions of the herd, or of the cowshed, have been swept away?—Not by the disease itself; a large quantity have had the disease, but a large proportion has not been swept away by the disease. I have not myself been personally to many cowsheds, but in those one or two where I have been I found it invariably the case that a minority of the cows had the disease, and were slaughtered in consequence, and the great majority of them are sent away from fear, and from the men being so perfectly paralysed.

2146. In how many cowsheds have you seen that to be the case?—Only one or two.

2147. Can you give us at all the number of animals which you have seen cured of the disease?—I only know of two cases where they have tried it. One where the disease had got through the shed, and they only tried it upon a small number; there were only two cows in one shed, where both were cured, and it was not a medical man who tried it there; the man succeeded in two or three cases in another shed, but cows died there, and lay for 36 hours, and were surrounded by 14 or 20 cows standing round them. In another case, where the person tried curative means, he sent away six or eight of his cows as soon as the disease appeared, and he saved eight out of eighteen..

2148. Had they been attacked?—Four of them had never been attacked, and the other four which were saved had been attacked, and recovered from it. They are all now giving milk, and they are kept in an isolated place.

2149. Were they saved by the veterinary surgeon?—Yes, no doubt of it.

2150. Have you seen the cows yourself?—Yes; and they are I believe giving milk. I think that that person had four different people to practise upon his cows. He gave each one or two cows to attend to.

2151. You do not know who the veterinary surgeons were who saved the four that were cured?—I believe that one man saved two, and another man one, and another man one, but I do not know their names; that is out of the 18 altogether. Out of the 18 cattle 10 were attacked, of which four were saved, and four were not attacked at all, by giving them preventive stuff, which he had at disposal. There have been several cargoes of cattle stopped from abroad, but in only one case has the animal been affected by the disease, and that came from Holland; and there are beasts now alive out of this cargo of cattle, and that is about four or five weeks ago; the Custom House will not give them up before they are healthy. A short time ago a cargo was stopped at Harwich, consisting of cattle, sheep, pigs, and calves; the whole were stopped; in about three or four days the sheep and the pigs were passed, the remainder were ordered to be kept, and we generally find that

it is better for us to kill them at once to save their wasting, than to have them kept in quarantine, because the Custom House will very seldom pass them until they have been kept a very long while. One man saved his beasts; they had been stopped 14 days last Wednesday, and they were passed without the slightest disease of any sort. Therefore if it was the disease it could not be so contagious, or these other beasts musts have taken it. Out of the whole cargo only one was seen with the slightest effect upon it.

2152. Is it your opinion that the inspectors at the out-ports are generally competent to their duties?—I only know the inspector at Harwich, and I believe that he is a man perfectly competent for his duties; that is the only one that I have seen personally myself.

2153. (*Mr. Read.*) Can you mention to the Commission any further proved cases of recovery from the plague?—I can only mention those two or three which I have mentioned; they are the only ones which I have taken any interest in, and I should infer that many cowkeepers in London must have some means of cure or prevention because they are refilling their sheds. I do not think that they would risk high priced cows unless they had some preventive.

2154. You do not believe that the disease is contagious?—Yes, I believe that it is contagious.

2155. But not so much as has been asserted?—Not so much as has been aserted.

2156. Do you not think that should the plague break out in 10 animals among 100 it would affect the lot?—I am not certain that those standing in the market would affect the whole lot; we have proof that they do not.

2157. What is your opinion of the origin of the disease?—It is impossible, I believe, for anyone to state the origin of the disease. I heard of the first case within a few day of its breaking out, and it broke out at first at Islington in a dairy. Professor Simonds told me that it was a disease which he had never seen, though he had seen the disease of the Rinderpest, I believe, in Russia.

2158. (*Viscount Cranborne.*) When did Professor Simonds make that statement to you?—I can hardly state the exact date, but it was a few days before the opening of the Royal Agricultural Show at Plymouth. I can give you the exact words of Professor Simonds, and I will give the Commission the reason why I asked the question of him. Last year I was connected very much in the trade with Mr. Hönck, who has been examined, I believe, before this Commission, and I felt rather an interest in it, knowing that the disease is always laid upon the foreign cattle, and when it broke out this year I saw Mr. Hönck, and I had heard Professor Simonds give a dreadful account of what the Rinderpest was. In June last I was told of this disease; then I asked the nature of it, and I could not learn. I was then told that Professor Simonds had been called in. I saw him in the market, and spoke to him about it, and I said to him, after telling him that it was a very bad disease, "Have you ever seen anything of the kind before," and he said "No, I have never seen anything like it."

2159. (*Mr. Read.*) Did he say in England?—He did not say in England. I did not ask him whether it was Rinderpest, but I asked him, "Did you ever see a disease like this before," and he said "No."

2160. Have you ever seen a disease like it before?—I have never seen the Rinderpest.

2161. Have you ever seen a disease like this?—No.

2162. You would consider it a new disease?—I should consider so.

2163. (*To Mr. Hicks.*) What is your opinion of the character of the disease?—That it must have been imported; it was unknown in this country up to some time in June. I believe it to be most contagious, and I have no doubt that the whole of this trouble has arisen from perhaps one or two solitary animals which have unfortunately come over with it; and I believe that it will affect the whole country;—it has done so.

2164. Do you think that it is the Russian Rinderpest?—I do.

2165. Do you not receive large supplies of dead meat from Scotland?—Yes, very large.

2166. Especially in the autumn and winter?—Yes.

2167. Would it be a greater hardship for the people of Birmingham to get their dead meat from London than for the Scotch people to send it there?—The Birmingham people do not get their large supply from London. I think that they get their principal supply from Ireland.

2168. We will say Plymouth or any large town?—Brighton, for instance, is almost entirely supplied from London at this time of the year, and the South Coast entirely at this time of the year.

2169. Take Brighton?—It would be a very serious inconvenience to them.

2170. I do not mean in the summer months, but say for three months in the autumn and the winter?—It would be a very serious inconvenience to them to carry the meat down there dead.

2171. Do you think that it would be judicious to stop all store markets and fairs for a time in the provinces?—In infected districts it would; it is a very serious thing. I think that they had better not be held there, but then it must not be evaded in other ways.

2172. In the case of the large importations of Irish cattle which we have in Norfolk at this season of the year, if you stopped the fairs in Norfolk, how do you suppose that they would be disposed of?—It would be useless to bring them; they could not be disposed of. The Norfolk men are afraid to buy them at the present time. I believe that Norfolk, at the present time, is in a very serious condition; with so much feed there, turnips in particular, they are afraid to put stock upon the land, and many of the farmers have no stock, and those who have bought them have killed them; but I think that a great many more have been killed than there has been any occasion for. For instance, if a farmer has the disease breaking out, the inspector perhaps compels him to kill his animals, and bury them; and I think that is a great waste. A farmer perhaps might have the option to kill or cure, but they should not be allowed to go off the farm. Inspectors have been called to see cattle, and have pronounced them to have the Rinderpest, and they have had them shot and buried.

2173. Do you know of a case of an inspector ordering any sound cattle to be shot?—No; but it is very difficult for them to discern between sound and unsound cattle. A case occurred a few weeks ago in our cattle market, where Mr. Tegg, our inspector, was told that there were some cattle ought to be seized; and I suggested that, instead of having the whole killed, two or three should be picked out, and we were all unanimous afterwards that they were all perfectly sound.

2174. What was the matter with them?—Nothing; probably they had been out all night. They were shivering with cold, and were dull about the eyes, but there was nothing wrong in the interior of them. We were all wrong.

2175. (*Dr. Playfair.*) You have said that it would be of great importance, in order to induce the farmers to be honest by making it to their interest to be so, that the Government should pay them for all cattle which died of disease?—Yes.

2176. Or would you limit the recommendation to the cattle slaughtered by order of the Government inspector?—It would amount to the same thing, because they would be slaughtered under the guidance of the Government inspector.

2177. Would you recommend payment for those which died naturally of disease?—Of this disease.

2178. Would not that, instead of inducing the country to be honest, produce an immense amount of dishonesty?—It would require a great supervision

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and my recommendation would be, that a percentage should be paid, and not the whole value.

2179. Do you not think that as some kind of compensation might be desirable the safest plan would be to carry it out by mutual assurance, and not by the Government at all, by which means the interests of all the farmers would be involved in protecting themselves from any dishonesty?—But the great point which I should aim at in this compensation would be to bring out the grand secret where the disease is. I think that the money is quite subordinate to the question as to where the disease is.

2180. Could not it be done by mutual assurance as well as by the Government?—I do not think so.

2181. Are you not aware that in some countries there is a system of compulsory mutual assurance throughout the whole country?—I am not aware of it. Where a loss is sustained by this disease men endeavour to keep it secret, because it puts a ban upon themselves and their business, and the consequence is that they endeavour to get rid of the invisible portion of the disease, and their animals therefore contaminate all that they come in contact with.

2182. (*Chairman.*) With regard to the way in which you carry out your trade, do you keep any cattle yourself?—None.

2183. Are the cattle consigned to you from farmers or salesmen?—From persons of all classes who deal in cattle; farmers, graziers, dealers, and sometimes salesmen, who cannot sell them in the country markets. Perhaps a gentleman may send cattle to a particular market, with an order that if they do not make a certain price they shall go to London, and then they would come on.

2184. You have said that at this time of the year a great part of the southern towns in England are supplied with dead meat, instead of having cattle sent to them alive; is that dead meat consigned to you?—The county of Kent, and a portion of the south of England, is supplied from our Metropolitan Market.

2185. But in your line of business as a cattle salesman do any of those orders for meat come to you?—The dealers and butchers attend the cattle market, and buy some themselves according to where they suit themselves best; sometimes they deal with me, and sometimes they deal with others, according to where they find that the article suits them.

2186. Supposing that a stoppage of all movement of live cattle took place in the country, would it stop your business? Some witnesses have suggested a total stoppage of the movement of cattle, and that they should all be slaughtered either at the port where they arrive, or at the farm where they are grazed?—I think that that would be at variance with the summons which brings me here. I believe that it would be totally impracticable; it would be like commercial death; the supply and demand would be divided.

2187. Would it entirely destroy your business?—It might lessen it to a certain extent; but that would be a very minor consideration in opposition to the great question which we are met upon; it would be a question of pounds, shillings, and pence; and this is far beyond that.

2188. Would any business remain in your hands? Certainly; because the cattle which are sent to the continent would find their way there.

2189. I refer to cattle being sent as meat. The suggestion of some witnesses is that the animals should be slaughtered on the spot where they are grazed, or where they are landed?—I do not see that it would injure my trade in any way. I may perhaps explain that I have two trades: I am a cattle salesman, and I am also a dead meat salesman.

2190. (*Viscount Cranborne.*) It would leave you where you were?—Yes.

2191. (*Chairman.*) Are all salesmen connected with dead meat?—No; very few.

2192. How would it affect a person who was solely a salesman of live cattle?—It would shorten the supply generally; but still the cattle are sent to London by persons abroad and at home, to be sold without reference to their destination, and it is for the salesman to find a customer, and therefore the cattle would find their way to London; but if the country buyers were excluded the competition would be less, and the price lower, and the cattle would not make a remunerative price.

2193. Supposing that I had been in the habit of sending my cattle to you to be sold, and that an order was issued forbidding the movement of those cattle, would it not be probable that I should send to you to effect the sale of those cattle in the country to London butchers, supposing that I wished to send them to the London market instead of to a country market?—I think not.

2194. What would be the process?—The process would be that you would sell them at home to country buyers. I do not think that a London salesman could undertake to go to different farmers in different parts of the country; it would be so undefined, and he would make so many journeys for nothing, that I do not think that it would be carried out; they would all be sold in the country by the steward, or in the best way that they could.

2195. (*Dr. Playfair.*) Or sent up as dead meat?—Or sent up as dead meat.

2196. (*Chairman.*) Do you consider that the Metropolitan Market is one of the great means of transmitting the disease throughout the country?—I consider that it has been; what it may be I cannot say. You will find that whenever the disease has broken out in the cowsheds of London the cowkeepers have endeavoured to get rid of their stock, although apparently sound; they immediately send them off to the Metropolitan Market to be sold, and these cows are bought by many of the country jobbers to take into the country, because they are bought cheaper, and by the time that they get away the disease appears in them, and communicates itself right and left throughout the country, which is the cause of its having spread.

2197. And this is still going on?—As the cows die out there are fewer to remain behind, but the mischief has been done.

2198. You have alluded to a case at Aylesbury, where the cows were bought very recently?—Yes; either last Monday or last Monday week, and they have caused great danger and trouble.

2199. Was it before the last Order in Council was passed with regard to the slaughter in the market?—I should think that it was since; but the difficulty is this, a man may act bonâ fide, and yet be very far wrong, because an animal may not show the complaint in the market on Monday, although it may have it invisibly, and in the course of 48 hours it may break out, and perhaps may be transported 50 or 100 miles, into a different neighbourhood, and give it to a hitherto healthy district.

2200. Then with the views which you have, how would you check the spread of the disease from the Metropolitan Market?—That is a very difficult question. Isolation is the only effectual cure. I can use no other word.

2201. (*Viscount Cranborne.*) You do not propose to isolate London?—There is the difficulty; if I could do that I should have no trouble about it.

2202. (*Chairman.*) You have talked of pure isolation. When the disease has spread to more than 30 counties in England, how can there be isolation without stopping the movement of cattle all over England?—In this form: The only precaution to be adopted would be to isolate those animals which are affected and those which are in the company of those which are affected. If you can isolate upon a farm all the property of the proprietor, those of other proprietors which are sound can be moved with impunity. Owners immediately get rid of diseased stock, and the consequence is that they contaminate

everything that they meet with, and thus the disease spreads; but, if every person, when his stock has the disease, could have it isolated for a certain time, the disease must die out in his own hands, in the same way as a candle dies out in the socket.

2203. With those views have you thought how the matter could be properly carried out with regard to the isolation of infected districts, of course including the Metropolitan Market?—The Metropolitan Market is a stumbling block which I cannot get over; but leaving this out, I think that the matter might be successfully combated, because, if A has a number of his stock affected he will be sure to endeavour to cure or to kill, and if he kills in the early stage it will not be a total loss; but he must not move his stock away from the farm where they are.

2204. (*Dr. Playfair.*) How would you prevent him from doing so?—By penal enactments.

2205. But have you not said that in the early stages nobody knows whether the stock is diseased or not?—In the incubation of the disease we cannot tell, but after it has broken out then it is visible, and those cattle who do not show it may have it invisibly. At the same time I should do a great deal in the way of compensation.

2206. (*Chairman.*) Do you consider the manner in which the Metropolitan Market is disinfected now sufficient?—I do not see what more they can do; they pour lime over the market.

2207. Do you believe that healthy cattle coming on to the Metropolitan Market might not take the disorder from standing on the ground where infected animals had previously been?—They would be more likely to take it from lying in the lairs.

2208. Do you believe that healthy animals can contract the disease by standing in the Metropolitan Market?—I believe that if healthy animals are at the lairs where unhealthy animals have left their saliva and filth they will catch it, or if they stand in the manure. I doubt whether it is in human power to disinfect the market effectually.

2209. Then in all probability the greater portion of animals coming to the Metropolitan Market may be infected with the disorder when they leave it?—A portion may.

2210. You have stated something important with regard to the lairs; will you state in what condition the lairs of London now are?—They are better than they used to be, because the Corporation of London have given more attention and labour to clean them out; but they have been very bad in former times.

2211. Are they under the supervision of the Corporation?—Yes.

2212. What do the lairs consist of?—They are covered buildings open at the sides, and with water troughs, and rails to put the hay in; and they are wooded up to the roofs in the middle, because they were bitterly cold, and it was done because the animals suffered so much from the night winds; but still those lairs for many years past have been a fertile source of the foot and mouth complaint.

2213. And you think that now they are a fertile source of the Rinderpest?—I think that there is no doubt about it.

2214. How would you cure this danger?—There is the difficulty. I think that many persons might offer advice which would be worth very little to you. I could not give any advice upon the point.

2215. Would you close the lairs for a time?—I do not know where you would take the cattle to, because other places would become the same where any cattle might be together in large numbers.

2216. Are not farmers rather afraid of sending their cattle to the market now, for fear they should not be sold, and then be seized by the inspectors?—I think not, the demand for cattle and for beef is equally large all over the country, and I think that at the present time they almost get a better price at many other places where there are not such large consignments of foreign cattle to compete with them.

2217. But I have understood that the graziers in the midland counties very recently were afraid of sending their stock to London for fear they should not be sold, and should return to them with the seeds of the infection in them?—Some might form that opinion; it is a question of price, or they might always be sold.

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2218. You have stated that you have a large trade with Ireland?—Yes, from Dublin.

2219. What is the amount per week?—There are now very few cattle coming from Ireland; the senders have lost money by it, and have given it up; perhaps now there are 200 a week; last year there were 1,000 or 1,200. They send about 2,000 a week to Liverpool, the prices being better and the expenses less.

2220. Do they send from Ireland to England large quantities of lean cattle?—Yes; but not to London.

Mr. Brewster.—I think not, at present.

Mr. Hicks.—They do not come to London at all events. The probability is that a large number in the usual course of events would go to Norfolk and the grazing districts from Ireland, but not to London.

2221. (*To Mr. Brewster.*) You consider this disorder more serious than pleuro-pneumonia?—The results are shown more quickly; the animal dies sooner from it if it is not cured.

2222. Do you consider it as contagious as pleuro-pneumonia?—I should consider it more contagious than pleuro-pneumonia.

2223. You deal largely in sheep?—Yes.

2224. Are you at all afraid of the Rinderpest attacking sheep?—The only thing from which I can form any opinion is from the statement which has always been made, that it did not attack any other animal; that the Rinderpest would only attack the ox or cow; it is now stated that it attacks sheep; but I have seen no instance of it myself, and I almost question it, because I have seen sheep looking very much like it which have not had it.

2225. (*Viscount Cranborne.*) Can you give the name of the person who had the four cows cured?—Marcus Poole; he could be found in the Metropolitan Cattle Market; he is a very large consignor of stock to London, and he tried the experiment with these cows, believing it was cholera.

2226. (*Dr. Playfair.*) I suppose you are aware that there are always a certain number of cattle that survive the attack?—I believe so.

2227. But still would that isolated case of four cattle which you have mentioned influence you in regarding the disease as not a very fatal one, if in the large number of cases in the country 90 per cent. die?—If I knew that they died from that disease I should say that it was extremely fatal. If, in the case of animals in a country place in a good state of health, 90 per cent died, and only 50 per cent. in London, and if it was the first case of treatment, I should think that it was more curious still.

Mr. Hicks.—It would be important to remove all dairy farms from the metropolis; it has been a crying evil for many years.

2228. How far would you remove them?—Six miles.

2229. Do you consider them in a very bad state?—Yes; they are a public nuisance to the inhabitants. It is a beastly concern altogether.

2230. Are they badly drained?—Some of them are well drained, but some of them are beastly, and the whole course of producing milk is a beastly transaction. The cows stand for four or five years without moving out of the shed. All the offices of nature are done there, and it is a filthy concern.

2231. (*Mr. Read.*) What particular hardship would it be to kill all the cattle in London which are sent to the Metropolitan Market, for say the space of a month or six weeks?—There is no accommodation to do it; that would be a great hardship now. Last Monday week, Mr. Hollerton, of Plymouth, bought 150 beasts and 300 sheep for his contracts at Plymouth. If they were to be killed here the expense and the loss would be ruinous.

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2232. Why would it be so? Why would it be more impossible than killing cattle and sending them from Scotland?—There is no accommodation for killing them here; we have not now sufficient accommodation to slaughter cattle at the Cattle Market.

2233. Would it be a very serious thing to run up some slaughter-houses in the course of a fortnight, with wood and slate?—Sometimes more haste worse speed.

2234. Is not that the only way in which you could deal with the metropolis? — It would be a very effectual way.

2235. And surely for a month or six weeks it would not be such a great hardship?—There is the county of Kent. I should not like to commit myself to answering the question in the affirmative, though I should be glad if it could be carried out.

2236. There is no other way in which you think that it could be done?—I cannot answer that qestion.

2237. (*Chairman.*) The Commission will be very glad to hear any additional remarks to which you wish to draw their attention?—If anything further should strike me the Commission would probably allow me to communicate it in writing.

2238. (*To Mr. Brewster.*) Have you anything which you wish to add?—With regard to prohibiting passing along the roads, supposing that this dise se must be put out, that would be the only way in which you could do it. If you allow a man to send his cattle for a certain purpose to market you can never tell for what purpose they are sent to market. You could punish a man for sending them along the road, but it would be a very serious thing, it would be almost the last extremity, and would raise the price very much indeed, because each farmer would lose very much; he would lose the whole of the profit from the offal, and to a very great extent, it would very materially raise the price of meat. Then with regard to the importation of cattle from abroad, it would require long notice to get sufficient slaughter-houses at the port of disembarkation, and for a long while it would be almost impossible to do it, that is to say, for the next two or three months. A large supply now comes from abroad, larger perhaps than at any other time, and it would require a great space if you compelled those animals to be killed at the spot where they were landed. A great many of them go into the country towns to be killed, where they have no meat in their neighbourhood. The killing them at the port seems to me impossible; but it would appear to be almost the only effectual mode of accomplishing the object; it would, however, be almost one of the last things which I would do.

2239. Supposing that a sufficient number of slaughter-houses for the accommodation of sheep and cattle coming from abroad were afforded; do you believe that such a measure as that would stop foreigners sending cattle?—It would to a certain extent, because it is done upon a very small amount of profit. A great number of cattle come here from Germany; they come upon certain railways to a central point in the northern part of Germany, and from there the parties receive their orders whether they shall come on to Paris, to Brussels, to London, or to Lille, or other parts of the continent. If the price is a little dearer in Paris than in London they go there; if the price is a little dearer in Belgium than in London they go there; and it has this effect, that by a large amount of expense and loss being placed upon the cattle here it drives a larger number of them into those countries; for instance, in the neighbourhood of Lille and the large manufacturing districts of France and Belgium meat is reduced in price as restrictions are placed upon the importation of foreign cattle here, and therefore they get a great advantage from it, and they consume a large amount of meat.

2240. I understood you or Mr. Hicks to say that the measure of slaughtering upon the spot would have the effect of raising very much the price of meat in England?—It would raise the price of meat in England; but it would reduce the price to the man who sent it here, because his expenses would be larger, and his loss upon the minutiæ of the animal would be larger; the price to him would not be so large, though the consumers here would have to pay more money for the article.

2241. But if the price of meat was somewhat larger, it would be an attraction to him to send his cattle here rather than to Brussels or other continental towns?—The price of meat would be higher because of the amount of waste.

Mr. Hicks.—London would be overloaded with meat, while the country, which is usually supplied from London, would be denuded of it. A large portion is bought by jobbers, who take it to Ashford, and Canterbury, and Chichester, and other markets in the country, and sell it to small butchers. They meet the jobber, and buy the stock which he has bought in London.

2242. (*Mr. Read.*) (*To Mr. Brewster.*) You think that it would be preferable to kill cattle in London rather than at the outports?—Certainly; you stop importation very largely by killing them at the port of importation.

2243. Would it interfere very largely with the trade if you killed all foreign cattle in London?—Very materially.

2244. But not so much as if they were killed at the outports?—Yes; and it would not be of any advantage, because they do not come diseased.

Mr. Hicks.—I think that it would drive many of the buyers away from the London Market, and that many of the country buyers would not come to London, but would buy in the country.

2245. Supposing that there were no country markets, what would be the effect?—It is a very difficult question. The buyers must ride from farm to farm to find what they require, and waste half their time.

The witnesses withdrew.

Adjourned to to-morrow at 12 o'clock.

Saturday, 14th October 1865.

PRESENT:

Earl Spencer.	Dr. Quain.
Viscount Cranborne.	Dr. Parkes.
Mr. Lowe.	Mr. M'Clean.
Dr. Lyon Playfair.	Mr. Wormald.
Mr. Read.	Professor Spooner.

EARL SPENCER IN THE CHAIR.

Professor G. T. Brown.

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PROFESSOR BROWN further examined.

2246. (*Chairman.*) Will you state the staff which you have under you for the purpose of inspecting the metropolitan district? — There are 26 inspectors, appointed by the Privy Council, now engaged in different parts of the metropolitan district.

2247. Can you state whether they are veterinary surgeons in every case?—All the inspectors appointed by the Privy Council are members of the Royal College of Veterinary Surgeons, but there are other inspectors in the metropolitan district who are

appointed by the magistrates; those are commonly not veterinary surgeons. I do not know that they are veterinary surgeons; some are butchers, and I believe that one or two are tradesmen. I think that one or two shoemakers are engaged as inspectors.

2248. Are they appointed by the Middlesex magistrates?—By the magistrates in different parts of the district.

2249. Without any knowledge of veterinary science at all?—Without any proper veterinary qualification.

2250. Are they under your supervision?—No; I have no particular cognizance of them, but only of those appointed by the Privy Council.

2251. Is any list furnished to the Privy Council of these inspectors appointed by the magistrates?—No, I think not.

2252. Are there any other inspectors besides these inspectors appointed by the Privy Council Office and by the magistrates?—There are the meat inspectors of the Metropolitan Market appointed by the Corporation, and some of them are also appointed inspectors under the Order in Council by the corporation; those are not under the cognizance of the Privy Council.

2253. Will you state what are the duties of the inspectors appointed by the Privy Council Office?—Their duty is to attend in the first place at any shed from which notice of the presence of the disease may be sent. They are also required to attend wherever they have reason to suspect the presence of the disease, and having found it, to be present, it is their duty to report to the veterinary department all the particulars relating to the outbreak. They are also required to instruct the owner in the proper course to pursue. Any animals which they consider dangerous to the neighbourhood, or likely to spread the disease in any direction, they are authorized to cause to be destroyed, buried, or otherwise properly disposed of, according to circumstances. In the event of the owner desiring it, they are authorized to give a certificate which shall enable him to take away all the animals which are not suffering from the disease, but which have been exposed to the infection, to the nearest slaughter-house, in order that they may be slaughtered by the butcher, and dressed for human food. It is the inspector's duty also to prevent the removal of any animals, either diseased or infected (that is to say, having been associated with diseased animals,) to any public market, or to allow them to be travelled along any public road; those are the principal duties.

2254. Is the metropolitan district mapped out to each of these inspectors?—Yes; it is mapped out, but not in a very exact way; it was found excessively difficult to arrange it.

2255. Can you give any idea of the number of cowsheds which come under the superintendence of one inspector?—There is one inspector now acting for St. Pancras and St. Marylebone, and in the parish of St. Pancras there are 99 cowsheds, and in Marylebone 69, or nearly about that number; it is his duty to take cognizance of the whole of those sheds.

2256. Is he able to do that business thoroughly?—The person who is now holding that office is able to do so, as he has nothing else to do. He was a veterinary surgeon not practising at the time of his appointment, and he devotes his whole attention to it.

2257. How does he obtain information with regard to disease in any of the cowsheds?—He goes round to every shed. I instructed him to do so, in order that we might get the fullest information from that quarter.

2258. How often do you suppose that he visits each shed?—That depends upon circumstances. If the disease has broken out, he contrives, if possible, to pay a visit to that shed once a day, or once every other day, according to the urgency of the case. If all the animals are healthy, he probably would pay a visit two or three times a week, in order that he might be able to mark when the disease first appeared.

2259. Do you think that he can sufficiently carry on his inspection?—I think that in this particular case he can, having no practice to attend to.

2260. Are there any cases where there is not a sufficient staff to carry on the inspection thoroughly?—I am clear that there are cases where the inspection is not efficiently carried out. In the district of Willesden, for example, which lies between two inspectors, one at Paddington and one at Stanmore, there have been complaints which have recently reached us as to the inspection not being efficient; There are eight or nine large cowkeepers whose names I have just had given to me from that district, and it is stated that the inspector has not visited this place, or only very occasionally; there is no one appointed for that particular district.

2261. Do you know the number of sheds which that inspector has under his supervision?—The one at Paddington has the whole of the Paddington parish, and I think that there are between 30 and 40 cowsheds there. The one at Stanmore has a very large district, confined entirely to the country division: that is to say, that his inspection would refer particularly to farms. He has to travel considerable distances. I do not think that it would be possible for either of those gentlemen efficiently to inspect the whole of the country which lies between them.

2262. You have spoken of the inspectors appointed by the magistrates; how do their duties differ from those of the inspectors appointed by the Government?—In no way; their duties are exactly the same, and some of them send returns to this department.

2263. Do they generally co-operate with the inspectors appointed by the Privy Council?—I am afraid not. I think that they are rather opposed to them.

2264. Have the Privy Council inspectors any authority over these local inspectors?—They have no authority over them, but as far as the Privy Council is concerned they would take precedence of them. In the event of there being a question as to which inspector should give the necessary directions, the directions given by the inspector appointed by the Privy Council would take action irrespective of the inspector appointed by the magistrates.

2265. Have you heard any complaints of the manner in which these inspectors do their work?—At different times we have heard statements made to the effect that unqualified men were acting as inspectors, and that persons owning valuable stock objected to allow these men to give an opinion or to submit to their dictation when they ordered animals to be destroyed.

2266. Do you know anything of the district of Highgate?—I have been a great deal over that district.

2267. A gentleman whom we had before us yesterday, Mr. Gebhardt, has a farm of valuable pedigree stock there; are you aware of that?—I do not know Mr. Gebhardt's farm at Highgate.

2268. Do you know the inspector appointed by the magistrates there?—No; there is an inspector there appointed by the Privy Council; I know him.

2269. Are there any other sanitary officers belonging to parishes, or any other officers, who assist you in carrying on the inspection in the metropolis?—The sanitary officers appointed by the medical officers have to inspect the cowsheds, and in some cases they co-operate with the inspectors appointed by the Privy Council; in other cases they appear to me to be opposed to them. In many cases I should say that the Government inspectors do not co-operate with the sanitary inspectors.

2270. To what class do the sanitary inspectors belong?—They are not usually professional men, and it is difficult to say precisely from what class they are drawn, but they are looked upon more in the light of parochial officers than scientific men.

2271. What are the duties of the sanitary inspec-

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tors ?—Their duties in reference to the cowsheds are to make regular inspections, and to report as to the general character of the management, the drainage, the ventilation, the cleanliness of the establishment, and the general condition of the animals which they find there.

2272. To whom do they report ?—I presume that they report to the medical officer.

2273. Does your inspection extend to the lairs ?—Those are under the inspection of Mr. Tegg in the market, but I visit them frequently.

2274. Do the inspectors of markets and the inspectors of districts co-operate ?—Yes, generally. I should say decidedly so.

2275. When you were first appointed, in what condition did you find the cowsheds in the metropolis? —I found many of them in a very filthy condition, and in some of them, where the hygienic conditions were least attended to, the animals remained healthy, but in others they suffered in common with those which were kept in better conducted establishments.

2276. Have you any idea of the number of cows which have died in the metropolis ?—The returns which are at present made up state that there have been between 9,000 and 10,000 throughout the country ; but my own idea would be that there have been something like 4,000 or 5,000 animals lost to the metropolitan district alone.

2277. Do you know what the total number of cows ordinarily kept in the metropolis is ?—I do not, exactly.

2278. Have the precautions which have been taken with respect to cowsheds had any beneficial results ? —The grand result has been to cause those places to be emptied wherever the disease has broken out. All the animals which have not been affected have been sent away by the owners, and either sold or slaughtered.

2279. At the present time are there a large number of cows in the metropolitan cowsheds ?—No ; there is a very sensible diminution ; but I do not find that in those which still remain occupied by cows there is any great improvement in the sanitary regulations. It is very difficult to get the owners of those places to attend to any directions, even when they are not attended with any expense to themselves.

2280. Are not these metropolitan cowsheds all under licence ?—Yes, they are.

2281. To whom do the proprietors apply for their licences ?—I believe to the magistrates of the district or parish.

2282. Have there been many licences refused lately on account of the unhealthy state of the cowsheds ?—As far as I know, there is only one man who is to be opposed at present, but it is probable that when further evidence is obtained there will be several who will have their licences refused.

2283. Whose business is it to oppose these licences? —It is the business of the sanitary inspector, assisted by the Government inspector, if he has any evidence.

2284. In the metropolitan district was there not considerable difficulty in carrying out the order of the Privy Council with regard to burying carcases ? —Yes ; it was quite impossible.

2285. What became of the bodies ?—They were all taken into the knackers and horse slaughterers, principally some three or four which have establishments near the Islington Market, at a place called Belle Isle ; the principal part of them were taken there, and carried through the streets in open carts.

2286. What became of them when they reached Belle Isle ?—Those which are in tolerably good condition are skinned, and the flesh is boiled for cats and dogs to eat ; the hides are sent away without any attempt at disinfection. When the flesh is not fit to be used for dogs' meat, it is sometimes buried, when a person has premises which will enable him so to dispose of it ; if not, it is boiled down to a species of pulp, made into a kind of soup, and then run down the sewers.

2287. Is that a safe thing to do ?—No ; it is very unsafe indeed ; it is very objectionable in every way.

2288. Do you consider that the disease has been spread a good deal by this manner of making away with the dead bodies ?—I think that in all probability, from the entire want of precaution in the disposal of the hides, and also in the removal of the manure which has been sent into the country from the slaughter-yards, without being disinfected, the disease has been spread by those means.

2289. But under the orders of the Privy Council is there not power to bring the law into operation in this respect ?—On the owner's premises, but not otherwise.

2290. Can he remove them without being subject to a penalty ?—Yes ; there is nothing to prevent it ; but there is an Order in Council to compel disinfection previously. We are sending out instructions to the inspectors to see it done.

2291. I thought that it was necessary to have the superintendence of an inspector, if you were removing animals belonging to an infected herd. And the same with regard to the carcases ?—It is so, but practically inspectors have not ordered animals to be disinfected previous to removal.

2292. The fact is that the law has not been put into force, although there are powers to do it ?—The powers of the inspector would justify him in ordering carcases to be disinfected ; but there is no Order in Council making it imperative upon him to do so; it would be a private act of his own.

2293. I see that the 10th section of the order in Council of 22d of September is—"Every inspector "shall have power within his district to seize and "slaughter, or cause to be seized and slaughtered, "and to be buried, as hereafter directed, in any "convenient place, any animal labouring under the said "disorder," And the 11th section is, "Every in- "spector shall have power within his district to "cause to be cleansed and disinfected, in any manner "which he may think proper, any premises in which "animals labouring under the said disorder have been "or may be, and to cause to be disinfected, and if "necessary destroyed, any fodder, manure, or refuse "matter which he may deem likely to propagate the "said disorder. And every owner or occupier of "such premises shall obey any order given by such "inspector for that purpose ?"—Yes.

2294. Is not that carried out in practice ?—It is not carried out practically to any extent.

2295. Can you state why not ?—I am not enabled to answer that question. With reference to the destruction of manure, I believe that it would be altogether impracticable in the London cowsheds ; it must be taken away.

2296. Section 15. is, "No person in any district "for which an inspector has been appointed shall, "without the licence of the inspector, send or bring "to or from market, or remove from his land or "premises, any animal which has been in the same "shed or stable, or has been in the same herd or "flock, or has been in contact with any animal "labouring under the said disorder ?"—That has not been carried out ; in the first place, in consequence of the persons not giving notice; and, secondly, from the fact of their very frequently getting the animals away in the middle of the night, when they could only have been stopped by the police, who have only lately been asked to afford their assistance in preventing these things; that is to say, after nearly all the cowsheds have been emptied.*

2297. There is an important section, the 17th : "All animals having died of the said disorder, or "having been slaughtered on account thereof, shall "be buried with their skins, and with a sufficient "quantity of quick lime or other disinfectant, as "soon as practicable, and shall be covered with at "least five feet of earth, or shall, in districts for "which an inspector has been appointed, with the "consent of the owner, be otherwise disposed of "in manner directed by the inspector." You have

* *See* Note on 2319.

stated that dead animals were removed without the knowledge of the inspector; that therefore would be contrary to this section?—Decidedly.

2298. Do you think that it is practicable to carry out this order more efficiently?—I have no doubt that by having a larger staff of inspectors, and exercising a rigid superintendence, the Order in Council might be carried out more perfectly.

2299. (*Viscount Cranborne.*) Can you give me any reason why shoemakers are selected for the purpose of inspection?—No; I do not know any reason why they should be.

2300. Is it supposed on the part of the magistrates that there is any fitness in the trade of shoemaking for the duty of inspection?—I should think not.

2301. Then do you imagine that the fact of shoemakers having been appointed is the result of pure accident?—It would probably be the result of their having been recommended by some persons who considered them to be judges of diseased cattle.

2302. Do you know what the process is through which benches of magistrates go in appointing an inspector; do they require certificates or testimonials of any sort?—I cannot give any information upon that subject, because the appointments have taken place without the knowledge of the Privy Council or of the veterinary department, and they appear to have been made without reference to the Order in Council, which does not seem to authorize it, excepting out of the limits of the metropolitan district.

2303. Out of what fund are the inspectors paid?—It is not settled whether they shall be paid by the local authority who appoints them or by the Treasury.

2304. Has anybody been paid yet?—None of the inspectors have yet been paid.

2305. Do you know at all on what authority the magistrates appoint them. Is it only under the Order in Council, or is there any statute giving that authority?—I do not believe that there is any statute giving that authority, because these inspectors are only appointed upon this occasion under the Order in Council.

2306. For what period have these local inspectors been in office; for how many weeks?—I think that they have been in office something like ten weeks. I think that the earliest appointments by the magistrates in the metropolitan district were something like two months or ten weeks since.

2307. Has no kind of controversy arisen between the inspectors and their employers upon the subject of payment?—I have not heard of any.

2308. You do not know whether any list of inspectors thus appointed is rendered to any department of the Government?—I am not aware of there being a list.

2309. Has your attention been called to the 6th section of the Order in Council of the 22d of September, which runs as follows: "Every inspector shall "from time to time report to the local authority by "which he is appointed the steps taken by him for "carrying into effect the regulations prescribed by "this order; and the local authority shall certify, "in such manner as may be directed by one of Her "Majesty's Principal Secretaries of State, the number "of days that such inspector has actually been "engaged in the performance of his duty, and the "number of miles travelled by him while thus "engaged?" Do you know whether any directions have been issued by either of Her Majesty's Principal Secretaries of State in conformity with that section?—I do not; I only know that we consider that to apply to inspectors appointed out of the metropolitan district, but we have had one such return sent in (probably by mistake) to the veterinary department. The return merely incloses the inspector's account; it states nothing in reference to the steps which he has taken to carry out the Order in Council.

2310. The 7th section of the order is, "Every "inspector shall furnish the Lords of the Council "with such information in regard to the said "disorder as their Lordships may from time to "time, require." Have their Lordships required anything?—I am not aware.

2311. What is your ground for the opinion which you say is entertained that the words "local authority" under this order do not include any local authority situated within the metropolitan district?—I read the words to that effect in the second clause relating to the appointment of inspectors by the Clerk of the Council.

2312. Will you find me the words to which you refer?—It is in clause 2 of the Consolidated Order. The first extension of the order to the rest of England included that clause referring to the appointment by the magistrates.

2313. The magistrates at all events appear to have formed a different construction of the order from that which you have formed, and have themselves appointed inspectors?—Precisely.

2314. Have they done it all over the metropolitan district?—Only in some four or five instances which I have heard of; but we have no means of knowing, except from accidental information. There has been no return to this department of the number of inspectors appointed by local authorities.

2315. Nor any report of what those inspectors have done?—Only in one or two cases.

2316. Do you not occasionally receive complaints from parties as to the action of these inspectors?—One or two complaints have been made, generally in the course of conversation, but we have had no special complaints made to the department.

2317. Supposing that any policy of isolating places where the disease has broken out was to be undertaken, by drawing a sanitary cordon round the place infected, are there, in your opinion, a sufficient number of qualified inspectors to carry out that policy for all the places which are now affected with this disorder?—I am perfectly certain that there are not a sufficient number.

2318. And without a certain number of duly qualified persons such a policy could not be efficiently carried out?—I believe not.

2319. What was the date at which the police were requested to give aid to the inspectors in the supervision of the cattle sheds?—I believe about three weeks ago.*

2320. Which was considerably after the period of the greatest prevalence of the plague in London, was it not?—It was certainly considerably after that period.

2321. (*Dr. Parkes.*) I understood you to say that the 11th section of the consolidated order, which refers to the disinfection of premises, has been practically disregarded?—To a very great extent it has. The disinfection which is carried out in places where it is attempted at all amounts to a sprinkling of the floors and stalls with a little chloride of lime, or a little of M'Dougal's powder.

2322. No special instructions have been issued upon that point from any of the authorities of the Privy Council?—Instructions have been sent from our department, and further directions are about to be given.

2323. Then in all probability the recommendation which is given to the inspector to use any disinfectant which he pleases will be repealed?—The disinfectant which is to be employed by the inspector is chloride of lime. He is to receive instructions to buy a sufficient supply, and to employ a man to carry out the disinfection properly; and I have received instructions to employ a person to disinfect the slaughter-houses in the metropolitan district, and to see that he does his duty.

2324. Can you refer to any decided instances of the disease having been conveyed by manure?—We have no positive evidence of it, but complaints have been brought from different parts of the country where the disease has broken out, that the manure coming from the London sheds has not been disin-

* The witness subsequently stated that he was mistaken. The date was the 24th August.

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fected, and occasionaly a portion of the skin or the leg of a cow has been taken up in the act of removing the manure from the barges.

2325. In those cases did the local authorities attribute the breaking out of the disease to the manure ?—I believe that they did.

2326. In how many instances has that occurred ?—I have heard complaints some four or five times.

2327. Is the evidence satisfactory to your mind that the disease was really conveyed in that manner ?—No ; but the proceeding was nevertheless objectionable ; it clearly gave rise to suspicion.

2328. (*Mr. Read.*) I suppose that the justices generally appoint a qualified veterinary practitioner as inspector, if they can ?—I think that is probably the case.

3329. And if there is not one they appoint a shoemaker, or some other man who knows as little about stock?—Anybody that they can ; but that would not apply to the metropolitan district, where one would think that they could always obtain a veterinary surgeon.

2330. Do you say that there are no inspectors' returns sent to your department regularly every week ?—Not from those inspectors who are appointed by the magistrates in the metropolitan district, but in the counties all those who have been regularly appointed out of the metropolitan districts send in their returns, and they are under the same supervision as the returns received from the inspectors in the metropolitan district ; they are received in the department in the same way.

2331. If a carcase of a diseased cow has to be removed previous to burial, would it not be just as well to make artificial manure of it as to sell it for cats' meat, or to pour the soup from it down the sewers ?—There is no doubt that it would be much better to make artificial manure of the carcase, or to convert it into some other commercial product ; but the objection is that there are no chemical works at present established on a sufficiently extensive scale to allow of the reception of these animals.

2332. One would think that the sulphuric acid which is used in the manufacture of manure would totally destroy the seeds of the disease ?—There is no doubt that it would ; but in order that it should be properly applied it would be necessary that the animal should be cut up, and on making inquiries of those persons who used diseased meat, and bad meat, which they buy from the markets for manure, and for other commercial purposes, I have ascertained that they buy those portions of meat in joints which are conveniently arranged for at once being thrown into the boilers. It was stated to me that it would not be worth the while of the chemical manufacturers to take diseased cattle, and to employ men to cut them up before they could be placed in their boilers, as now arranged. They also stated that they would not like to employ their ordinary men, who are quite unaccustomed to such a process, for the purpose. Those chemical manufacturers who were in a position to make a contract on a large scale required a guarantee from the Government against the loss of any capital which they might expend, and they further required 1*l.* to be paid for each carcase from any part of the metropolitan district ; that contract the Government declined to accept.

2333. Then the artificial manure makers were not inclined to receive the carcases of the dead cows ?—The only artificial manure maker who would receive them was Mr. Odam, at the Isle of Dogs. He took a contract with the Government, engaging to pay something for the carcases, but a statement was made to the effect that the manure so obtained was likely to convey the infection over the country, and Mr. Odam immediately gave up the contract on the plea that it would injure his business.

2334. I suppose that that opinion was an erroneous one as to its possibility ?—In my opinion it was, but it was a general one ; the Lords of the Council certainly entertained it.

2335. Is it your opinion that making artificial manure would be greatly preferable to the present practice ? — Decidedly ; by the use of proper appliances, which are well known to those manufacturers, by which means it would not only remain perfectly harmless, but would be very valuable as a manure.

2336. Is it your opinion that the metropolitan dairies are a fruitful source of disease at other times besides the present ?—The animals there commonly suffer a great deal from foot and mouth disease, and also from pleuro-pneumonia.

2337. In your opinion ought they to be abolished ?—I have no hesitation in stating that that is my opinion ; that the time has come for it.

2338. (*Dr. Playfair.*) You have said that the manure in the metropolitan district is not disinfected ?—No ; not generally.

2339. You are no doubt aware that that manure contains all the highly contagious matter which runs from the nose and eyes of the animals ?—Yes.

2340. Are you also aware that that matter is ascertained to be contagious by inoculation ?—Yes.

2341. Do you not therefore think it very likely to be an extremely fertile source of distributing the disease throughout the country, by allowing such manure to go without being disinfected ?—I think that when the manure is removed in a fresh or recent condition from the sheds, and taken to short distances, it is likely to be the means of conveying the disease to other parts of the country ; but I do not think that when it has been kept for a considerable period, some eight or ten days, which it commonly is, it is likely to be so injurious.

2342. Are you aware that such matter has been kept for four or five months, and has been found equally infectious ?—I am not aware that this virus from animals suffering from the Cattle Plague has.

2343. You do not know of experiments on the continent where it has been kept for several months, 18, I believe, and has been found equally injurious at the end ?—I was not aware of those experiments.

2344. (*Mr. Read.*) Are there any statistics to prove the mortality of cows in the London cow-houses, previous to the outbreak of the plague ?—I am not aware of there being any statistics, but the fact is that they would be in the hands of the sanitary inspectors ; the veterinary surgeons have rarely or never visited London dairies, except under the present circumstances.

2345. The mortality would be very great ?—I really have no idea what it is ; the veterinary profession is seldom consulted at all by the owners of dairies. I do not think that I ever went into half-a-dozen cowsheds in London in my life, until the Cattle Plague broke out.

2346. (*Chairman.*) I see that you state that you know of some cases where some animals from infected sheds have been sent to the Metropolitan Market and elsewhere ?—Yes.

2347. Will you state some actual cases ?—I have an account of one man in Marylebone, who had 148 cows in five sheds in one yard, all adjoining. Of those animals 32 were killed or seized, he states, by which I conclude that some of them went to the market, and were seized there as diseased ones ; he states that 32 were killed or seized, and 104, I believe, sent away. He gives no information as to what became of them, and I presume that he does not know, they were sent to the market and were sold.

2348. And of course they were spread about in various parts of London and the country ?—Decidedly so.

2349. Have you any case in the country which you have traced up to London ?—I may refer to a case which I visited the day before yesterday in Hampshire, where the disease has broken out, and where one animal out of a herd of 19 was affected. As soon as it was ascertained that the animal was suffering from the disease, 15 of the herd were sold

to a butcher, and were sent up, it is presumed, to the Metropolitan Market. This was done, I am informed, under the sanction of a lawyer, who stated to the owner, who inquired whether he was justified in so doing, that as there was no inspector in the district he was not under the Order in Council at all.

2350. Can you trace that case up to a London dairy?—No. This happening under the last Order in Council, if the animals got into the Metropolitan Market they would be marked for slaughter; they are not allowed to be sold there for any other purpose. These were fat oxen, and the probability is that they would be shortly afterwards slaughtered, but they would be in railway trucks, and would go by road to the Metropolitan Market from the station, and if the disease was among them they would carry the infection.

2351. Can you state what system of inspection there is in rural districts?—So far as my observation has extended in the rural districts, the inspection is conducted in very much the same manner as it is in the metropolitan districts.

2352. (*Viscount Cranborne.*) By shoemakers?—No; I am speaking now of the properly appointed inspectors.

2353. (*Chairman.*) Are there two classes of inspectors in the country, those appointed by the Privy Council, and those appointed by the local authorities?—No; there are none in the country appointed by the Privy Council. Outside of the metropolitan district they are appointed by the local authorities. A great many of them are not members of the college, but what are commonly termed cow-leeches or farriers.

2354. Do you believe that those are competent people to act as inspectors?—I think that generally they are competent to act as inspectors, for the detection of the Cattle Plague; but I do not think that they are the men who ought to be intrusted with carrying out the Orders in Council, for the reason that their object is to increase their income by treating cases, instead of taking strict measures for the purpose of destroying infected animals, and preventing the spread of the disease.

2355. Would there be a sufficient number of properly authorized veterinary surgeons in the country to act as inspectors?—No; there are not a sufficient number.

2356. You have mentioned a case in Hampshire; was there in that case any inspector in the district?—There was a veterinary surgeon in the district, but he was not appointed until after those animals were sent away,—the same day.

2357. Are there many districts in the country where there are no inspectors?—I do not know of any districts where the disease exists in which there are not inspectors.

2358. Does it not generally happen in the country that the inspectors of markets and of districts are the same person?—It is very commonly the case.

2359. You have formed some opinion as to the inspection of fairs and markets and wharves, have you not?—Yes.

2360. Will you state it to the Commission?—With reference to the inspection of wharves and landing places generally, I am of opinion that so far as regards the extension of a contagious disease it is altogether useless; because no amount of knowledge is sufficient to enable a man to detect a disease in the incubative stage, when no evidence of it is expressed by external symptoms, and for the further reason that those inspections are generally conducted very loosely, the animals being merely driven from the landing place, and allowed to pass by the inspector, there being usually no convenience for the collection of a great number of them for a long time, and for such a time as would be required for the positive examination of every animal, and for the further reason that the fee allowed would be insufficient to remunerate the inspector for the trouble of examining individually every animal, in a cargo perhaps amounting to some hundreds. For the whole cargo he receives 10*s.* 6*d.*

2361. We have been told that the inspections at the ports, in which I suppose you include the wharves to which you allude, have been exceedingly severe lately?—They have been much more vigilant since the outbreak of the Cattle Plague, especially from the endeavour to detect instances of that disease; but the same argument applies there, that it is impossible for them to detect the disease in the incubative stage. I would make the same statement with reference to fairs and markets, and I should give as an illustration the inspection of Barnet Fair, which was conducted very carefully. I had a staff of inspectors for the purpose. I had the assistance of the mounted police, and a large body of men on foot. I had slaughtermen standing at the different roads ready to take charge of any animals which might be seized, and I had arrangements for burying any number of them which might be passed up to the fair. One result of the inspection was that a large number of them were not brought to the fairs at all, the owners of them forming private fairs some miles distant. We found dead animals in the fields some 10 or 12 miles from Barnet. The second result was, that all the diseased animals, which otherwise might have been brought up, and would have been detected when they were in the fair, were kept back, and animals which had probably been associated with them, or which had passed through infected districts, were brought to the fair, the inspectors not being able to detect that there was anything the matter. It was generally remarked that the stock in the fair was particularly healthy. I have since received intelligence of five or six outbreaks of the disease among animals which had been brought in lots from that fair, which was so rigidly inspected.

2362. Can you state in what part of the country the outbreak has been traced to Barnet Fair?—I do not precisely recollect in what parts, but in various directions, radiating from that point.

2363. It is a fair in which graziers and butchers buy from all parts of England, is it not?—Decidedly so.

2364. And you are now speaking of a place where the inspection was as efficient as you could make it?—As it was possible to be.

2365. What remedy would you suggest instead of inspection?—I see no remedy beyond stopping the fairs and markets altogether; that is what I should have advised instead of inspection.

2366. You would stop markets for butchers' meat as well as fairs for graziers of bullocks?—Not if the animals could be brought to the market with a clean bill of health, supposing that they had not come through infected districts, and that they had been in a healthy condition for a fortnight past; but I should only permit those animals to be sold to butchers on the authority of the market inspector, with his certificate, on the understanding that that certificate should be returned to him on his application, after the animals had been slaughtered.

2367. Supposing that this was carried out would you require a certificate before the animal actually left the farm where it was grazed?—Certainly.

2368. Would you forbid all movement of cattle until a certificate was given by an authority in the district that the cattle upon a certain farm in the district were free from infection, and therefore might be moved from the farm?—Decidedly so.

2369. Would you allow any to be taken away after having been a fortnight on a farm?—Any of them which came from perfectly healthy districts, and which were certified to have been in a state of health for at least the last 14 days, I should allow to be taken away.

2370. We had evidence yesterday from a gentleman who told us that he believed that healthy animals, perfectly free from the infection, would very likely catch the disorder from standing in the Metropolitan Market, though it was disinfected; might not that be

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the case in the country districts, where animals with a clean bill of health are exposed for sale?—Yes, if they had previously allowed infected animals to stand there; but in the event of this proposition being carried out infected animals could not be brought to market at all.

2371. What would you do with markets where infected animals had been in large numbers?—I should order them to be thoroughly disinfected before any other animals were put there.

2372. Do you believe that you could do that so effectually as to prevent contagion?—I think so.

2373. What would you do with regard to foreign cattle?—The only possible course that I see with reference to foreign cattle is to have them slaughtered on landing; that is to say, animals coming from infected districts, and to have them sent up in the form of butchers' meat.

2374. Do you think that such a course would be practicable at the ports of disembarkation?—I think that practically it would prevent importation to a great extent; but I am also of opinion that it would lead to the selection on the part of the importers of animals which were fit for the butchers only, and that store stock would not be sent over.

2375. But that would affect the value of the animal; they would not get so much for them if slaughtered at the landing-place as if sold in the Metropolitan Market?—They would not, certainly.

2376. (*Dr. Playfair.*) Do you know the case of W. Jones, who carried 124 beasts to the Barnet Market and to Barnet Fair, and lost the whole of them afterwards?—I have not heard of that case.

2377. Do you know the case of John Jones, who carried 73 head of Welch beasts to Barnet Fair, and lost the whole of them after passing through the fair?—I have not heard of any names of the owners of cattle in these cases. I have merely heard of certain cases where the disease has broken out. The Welch Fair was held some miles from Barnet.

2378. (*Mr. M'Clean.*) Did the local authorities pay for the inspection of Barnet Market?—No; nothing has been paid for the inspection of Barnet, but I understand that it is not to be paid by the local authorities. They applied to the Government, and the Government directed me to organize a system of inspection.

2379. (*Mr. Read.*) Could you trace the outbreak in Hampshire?—No; we could get no evidence of the disease nearer than Farnham, which was nine miles from the place where this herd was affected; but the evidence which I gained was not satisfactory, and I instructed the inspector to examine the whole of the district, and to report at once.

2380. As a matter of course, a great number of men are appointed inspectors who are not qualified in any way for their office?—I believe there are.

2381. Do you not think that a great deal of very wholesome meat has been destroyed by order of the inspectors?—The inspectors acting under the Order in Council are obliged to condemn all animals which have the disease, however slight the indication of it may be; but from the evidence which I have obtained from examinations of animals which have been apparently healthy I am quite clear on this one point that there are many animals condemned as unfit for human food in the early stage of the disease which present no further evidence of it internally than is presented by other animals which have been with infected ones, but which show in themselves no external indications of it, yet are suffering from it in the incubative stage.

2382. And those carcases would be fit for human food?—Those are legally fit for human food. I may state that from nine carcases which I condemned a few days ago, in consequence of finding that the animals had the disease, the men about the place were engaged in cutting off steaks, and taking them away, while the inspector was under my directions destroying the rest of the carcases. The meat looked perfectly healthy.

2383. Do you think that it is judicious to invest in some of these inspectors the power to go into a man's herd and order his bullocks to be slaughtered, without any compensation?—I do not know whether I should be justified in giving an opinion upon that subject. It is a power given by the Lords of the Privy Council.

2384. As there are a great number of incompetent inspectors, do you not think that it would be well to have one professional man in a county, as the chief or head inspector?—I think that it would be well to do so, if a man sufficiently competent could be found in each district or each county.

2385. No general order has been issued that the rural police are to assist the inspectors?—I believe not.*

2386. Do you think that their assistance would be very efficacious?—I have no doubt it would.

2387. The payment of 10*s.* 6*d.* for examining a cargo of cattle is as a matter of course very inadequate?—Entirely so.

2388. Have you not known a great number of inspectors refuse the appointment?—I have known inspectors refuse the appointment.

2389. And consequently a man of an inferior stamp has been appointed?—Decidedly.

2390. (*Viscount Cranborne.*) I understand you to say that you would have no objection to allow cattle to go up with a clean bill of health to a market, and then to be sent back to a grazier?—I have no objection to that course.

2391. Is it your opinion that a market can be so thoroughly disinfected that the subtle poison of the disease will not lodge in any part of it?—I think that if we used the proper measures it might be so disinfected, presuming that diseased animals were not again allowed to be brought there.

2392. I understood you in the earlier part of your evidence to say that in your opinion it was impossible for any person to tell an infected animal in the incubative stages of the disease?—I believe it to be impossible.

2393. It would be quite possible while the disease was incubating to obtain a clean bill of health in the district where the animal lived, and by the time it reached London the disease might come out?—Not if the bill of health referred to the state of health of the animal in the last fortnight, and to the fact of there being no disease in the district, unless the animal became infected on the road, and I do not think that then, during the incubative stage at that early period, any infection would be transmitted.

2394. Do you think that the cattle trucks on the railways are not capable of conveying infection?—I have no doubt that they are capable of conveying infection.

2395. Do you believe that with such efficient superintendence as could be instituted you could, with confidence, say that they had all been disinfected?—It would require a very elaborate and expensive machinery to carry out any such system properly.

2696. But without such a system the conveyance of cattle would always be dangerous?—Decidedly.

2397. A clean bill of health such as you suggest implies a competent inspector to give it?—Decidedly.

2398. And you have said that there are not a sufficient number of competent inspectors to exercise a superintendence over the whole of the country?—There are not.

2399. I conclude that your recommendation of permitting cattle to leave a market for the purposes of slaughter only refers to a condition of things far more favourable for ascertaining the existence of disease than exists among us at present?—Precisely. Then I may be allowed to state that I should only authorize their being removed to the nearest market.

2400. After the testimony of Lord Sydney, and the cases which you yourself witnessed in Norfolk, I suppose you are not prepared entirely to deny the possibility of infection in a train from animals feeding

* Subsequently corrected by the witness. An order had been issued to that effect.

y the roadside ?—I think it is highly probable that animals feeding by the roadside would convey the infection to others which were situated at some distance from them.

2401. Is it not the case that animals in the meadows might infect animals travelling by a train, especially at stations where they stopped, or when they were going slowly ?—I think it quite possible that they would do so.

2402. (*Mr. Read.*) Is it your opinion that it is better to abolish all fairs and markets for store stock for a time, but that fat stock might be sold in market as usual ?—That is my opinion, decidedly.

2403. Under certain restrictions which you have named ?—Yes ; it should be ascertained that they were slaughtered.

2404. Have you any means of supposing whether it would be possible to slaughter all the cattle in London which came into it ?—It would not be possible to slaughter all the animals which came into the Metropolitan Market in its slaughter-houses.

2405. But I say in London ?—It would be quite possible in London.

2406. (*Chairman.*) Since you were examined the other day, have any cases come to your notice in which there has been any difficulty in tracing the origin of the disease, in a district where there has been no disease before ?—The case which I have alluded to, which occurred the day before yesterday, in Hampshire, is the most marked one that I have met with lately.

2407. In what part of Hampshire was it ?—At a place called Bonham near Alton, and the nearest disease reported is at Farnham ; but I think it highly probable that the disease exists at other parts, because the inspector was not quite certain as to the nature of the disease, and for that reason I was sent down to decide the question. Now that he is acquainted with it I have advised him to make a close inspection round the whole of the country, and to report as early as possible.

2408. We have a return before us of the number of animals attacked by the disease in different counties and districts in England, and the number killed, the number which have died, and the number which have recovered. In what way did you obtain this information ?—It was sent by the inspectors principally, and occasionally from the superintendents of police. In a few instances we have had reports from the superintendents.

2409. Have all the local authorities who I imagine are acting under the Home Office had orders from the Home Office to send in reports of cases in their districts ?—I am not aware that they have had any orders to that effect.*

2410. Do you believe that this is a complete list of the cases which have occurred first of all in the metropolis ?—No ; I do not consider that all the cases of disease have been reported to us.

2411. How do the inspectors who have sent in returns obtain them ?—They obtain them by making inquiries of the owners of those sheds where the disease has occurred, and they frequently do not obtain any information at all, or have any suspscion of the disease having been present, until all the animals have been removed.

2412. Do you believe that it very often happens that a large number of animals have the disease, and die without notice of it coming to the inspectors ?—I am perfectly certain of the fact that it is so, and has been so from the first.

2313. It is in fact the interest of these people to keep secret what has occurred in their dairy or farm ?—Decidedly.

2414. Does that equally apply to the country as to the metropolis ?—I think it does.

2415. Then this return is worth very little ?—I am afraid that that there is a great deal yet to be added to it, from the statement which I heard of the total number of deaths, 9,000 or 10,000. I believe that it does not represent the loss which the country has sustained.

2416. This return would only show a small number of the deaths which have occurred ?—I am afraid that the number is very nearly double.

2417. (*Professor Spooner.*) You have said that the greater number of animals have died before the inspector has had any information ; do you mean that they have died, or that they have been sent away and slaughtered ?—A great many of them have been sent away and slaughtered. The animals are very frequently all gone before the inspector receives notice.

2418. (*Chairman.*) I see that in Middlesex the return of the animals which have been killed and died is 1,727 ; have you reason to believe that that is erroneous ?—I am aware myself of some 600 or 700 animals which have died or have been killed.

2419. Do you believe that 1,700 would represent the number which have died or have been killed in consequence of the disease in the metropolis ?—No ; I do not think that it is likely that I should have cognizance personally of nearly half the number or one third of the number.

2420. (*Viscount Cranborne.*) I suppose that it is very often very difficult for the person himself to say whether all the animals which have been killed have been killed entirely on account of the cattle disease. There must always be a large number which are killed from mixed motives ?—In reference to the dairymen, I think that there is no difficulty, because they would not send their cows to be killed unless from such fear.

2421. But in case of beasts, would there not always be a doubt ?—Not generally, because they would not send any beasts to be killed as a rule until they were perfectly fit for the butcher, or until the markets were in a favourable state ; so that if they were sent away in large numbers at unusual times it would be fair to conclude that they were so sent in consequence of the fear of loss from the Cattle Plague.

2422. What motive has a farmer to return the number of deaths to the inspector ; does it bring him any sort of advantage ?—Not at all ; there is no motive for it.

2423. Then these returns only represent those case where the farmers have done it out of pure public spirit ?—In answer to questions put by the inspector ; he has no means of compelling them to give information.

2424. How is the inspector induced to put any question ?—He commences by inquiring how many animals are usually kept upon the farm or in the shed.

2425. Do you mean to say that the inspectors have made an inspection of the whole country upon that principle ?—Yes.

2426. Have they inquired at every farm in the country ?—No ; only where they have known or supposed the disease to be present.

2427. Then in order for the inspector to give a true return it is first necessary that intelligence of the disease shall have reached him ; and, secondly, that the farmer shall be inclined to give a true and complete return ?—Certainly.

2428. (*Mr. Read.*) You would think that the return which you have sent in would be more correct as regards the provinces than as regards the city, would you not ?—I think it most likely that it would be so, because it is difficult to keep the disease secret in the country.

2429. And a great number of the cows in the London dairies were got rid of, I believe, before inspectors were appointed at all ?—I apprehend not a great number, because inspectors were appointed as early as the end of July, I think before the end of July, and notices were sent round. The first intimation which the cowkeepers had, I believe, of the presence of the disease, was in the notice sent by the Privy Council, and the effect of that notice was to cause the emptying of a great many sheds.

* The Home Office had in fact issued such orders.

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2430. We have had it in evidence that very early in July as many as 200 diseased cows were in the Metropolitan Market; that would be before the appointment of any inspectors, would it not?—Yes.

2431. I think it was the 10th of July. I suppose that a great many of these so-called spontaneous outbreaks, when they are thoroughly investigated, show some evidence of their having arisen from contagion?—I have not the slightest doubt that in every case contagion has been at work, but in a great many cases it is very difficult to trace direct contagion.

2432. But you very frequently have the means of proving contagion after an examination of the facts of the case?—Very frequently; and always in reference to the outbreak of the disease over a large extent of country. In a county, for example, you can always trace it; but it is difficult to trace it from the original centre.

2433. But has it not a new centre in Hampshire?—Farnham is close to it; it is within nine miles. It has been for some time at Winchester.

2434. (*Dr. Playfair.*) I think you said that the mortality was 9,000 or 10,000; it is almost exactly 12,000, namely, 5,000 and 7,000?—I believe it to be far beyond that number.

2435. (*Professor Spooner.*) That is to say, the number which have died or have been killed?—Yes.

2436. (*Mr. Wormald.*) What proportion of those animals which have been slaughtered have really been attacked by this disease?—I think that a very large proportion have had the disease, at least in the incubative stage, because the rule has been to send them away in small droves, as they became attacked. If one cow showed indications of the disease by the loss of milk, those which were fit to be sent to the butcher would be picked out and sent away, and then the shed would be kept in good condition until another was attacked.

2437. But you cannot say what proportion have been sent away which have not been attacked by the disease at all?—No.

2438. If an animal has been under the care of a veterinary surgeon, and the medicines which he has given have been rather powerful as regards their scent, and the animal has been slaughtered, supposing that that medicine has passed through the animal, can a butcher ascertain that the animal has taken medicine?—No, certainly not; I do not think that that is possible.

2439. I have had it stated to me by butchers that they could ascertain that fact, and that it deteriorates the value of the animal if it has taken those strong-smelling medicines?—I should have thought it altogether impossible, and in the course of the post-mortem examinations which I have made I never yet detected the scent of any medicine; in fact there are few medicines which one uses possessing a scent which would be sufficiently strong to overpower the smell of the carcase which was being dissected.

The witness withdrew.

Adjourned to Monday next at 12 o'clock.

Monday, 16th October 1865.

PRESENT:

Earl Spencer.	Dr. Quain.
Viscount Cranborne.	Mr. Read.
Mr. Lowe.	Dr. Parkes.
Dr. Lyon Playfair.	Mr. Ceely.
Dr. Bence Jones.	Professor Spooner.

EARL SPENCER IN THE CHAIR.

Mr. William Simmonds examined.

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2440. (*Chairman.*) You are inspector of cattle under the Custom House of the port of London?—Yes.

2441. Are you a veterinary surgeon?—Yes; I have been inspector of cattle for 21 years next March.

2442. Will you state what the ordinary character of your duty is?—To inspect all cattle, sheep, and pigs which arrive in the port of London, for infectious or contagious disease.

2443. Are no cattle allowed to be landed without a certificate from you?—They are all allowed to be landed, and they undergo my examination afterwards.

2444. Are you able to carry out a detailed examination of all the cargoes which arrive?—Yes.

2445. Have you any assistants?—Yes; there are two stations in the port of London, the upper and the lower. Mr. Holmans is at the upper station, and I am at the lower, and I have also my own assistant, Mr. Moss.

2446. About what number of cattle have you to inspect a day?—A great quantity at times. On Saturday and Sunday last there were nine vessels which arrived at two wharves, namely, Brown's and Brunswick Wharf. In those nine vessels there were 2,989 beasts, 5,464 sheep, and 324 pigs. Of course it took me the whole of the day. They were perfectly healthy, and with the exception of perhaps now and then one or two being with a broken leg, or bruised, or being suffocated, there was no disease.

2447. Have you ever discovered any cases of diseased animals arriving by foreign ships?—Within what time?

2448. Since the beginning of May?—Only by one vessel, the "Maas" from Rotterdam. She arrived, I think, on the 6th of September at Brown's Wharf at Blackwall.

2449. Will you state the circumstances of that case?—I happened to be there previously to the whole being landed. I should say that there were about 50 beasts at the time, and there was one cow which I saw with the Cattle Plague. That cow was immediately slaughtered; a post-mortem examination was made, and traces of the disease were perfectly shown. This was one of three cows surreptitiously put on board, as I imagined, without being either on the manifest or on the bill of lading; the two cows and a third cow were kept separate from the other cargo. The importers asked the question: What time of quarantine would be required? The answer was, 10 or 12 days. They thought that that was too long, and I suppose that, being satisfied that there was the disease in the one cow which was slaughtered and condemned, they made up their minds, and killed the whole of the cargo, with the exception of the two cows, and a cow which was with calf.

2450. From what port did this cargo come?—From Rotterdam.

2451. What was the date of its arrival in London?—The 6th of September; that was the first cargo from Rotterdam. In 12 days afterwards one of those cows was taken with the disease, and slaughtered

m the last stage. A few days after that the other cow was taken bad, and having the disease slightly, recovered. She was kept for the proper time of quarantine, and ordered to be delivered. The cow which was in calf calved about seven or eight days after she landed. She was taken with the disease about 12 or 13 days afterwards, and died, and also the calf, showing that the whole of the animals which were kept alive suffered from the disease. The whole cargo was 292.

2452. (*Mr. Read.*) You say that one animal recovered from the disease?—Yes; there is no doubt that she had the disease.

2453. (*Chairman.*) What became of that cow which had the disease and recovered?—She was delivered up to the General Steam Navigation Company, and I believe has been sold in the market this day.

2454. How long after she recovered from the disease was she delivered up?—She was kept from the 6th of September up to yesterday; she was sent away yesterday.

2455. Do you know the time which elapsed between her complete recovery and the time when she was sold?—I reported to the Commissioners last Monday that she was perfectly healthy and fit to be delivered. I should say that she came back to her food, and the secretions of milk, at least ten days previous to that.

2456. Ten days previous to the time when she was sold?—Yes.

2457. Where do you keep the animals which you detain?—On the wharf in lairs and pens.

2458. Are they perfectly separate from the places where stock congregate?—Yes.

2459. Is that the only case which you have had?—That is the only case which we have had from Rotterdam or any other place as far as regards the port of London.

2460. I see a case mentioned in the report from the Custom House of a steamer from Malmo; do you remember that case?—Yes. The Commissioners gave me orders to go down and inspect these animals which were detained; I inspected those cattle, and detected no disease whatever, with the exception of foot and tongue disease. The inspector, I think Mr. Wheeler, said that he had had one or two animals killed which were diseased, therefore I could not see them amongst them, because carbolic acid and lime were applied to them, and they were buried. I advised the Commissioners to keep those animals in quarantine for ten or twelve days, and if they were perfectly free from infectious or contagious disease to deliver them. There were 186 sheep in that case, and I found no disease with them, and I thought that it would be advisable to dip them in some disinfecting fluid such as chloride of lime or any fluid which they would like to have, and then deliver them.

2461. This case was not immediately under your own inspection?—No; it was another inspector altogether.

2462. Where was it?—At Thames Haven, some nine miles, I think, from Gravesend.

2463. Who was the inspector at Thames Haven?—Mr. Wheeler.

2464. Was he a veterinary surgeon?—Yes.

2465. Then as you had no evidence that there was Cattle Plague among this cargo you had the animals kept for a certain time, and when they showed no signs of the disease you allowed them to be delivered?—I advised the Commissioners to deliver them, which was done.

2466. There was another case which has come before us, which was the case of some Dutch cattle which were consigned by a Mr. Defries to his son in London; do you remember that case?—I remember seeing the cattle. I have at all times to attend at the wharves; on the Sunday and every day. I saw some 23 beasts tied on the wharf where my examination generally goes on. I have an officer attached to me from the Customs to attend to my orders, and I immediately said to this officer, "Those "animals have exzema and fever, and I will have "them immediately slaughtered." He said, "I beg "your pardon, they are going for export." I said, "Then I have no control over them."

2467. Can you state the date of that occurrence?—I think that it was on Sunday the 2d of July.

2468. Were you able to trace the history of those animals before that day?—Only by what the son told me; that he was commissioned by his father not to sell them under a certain price; he had taken them into the market three or four times, and they were turned out unsold. They were in Nichols's lairs; and of course being in Nichols's lairs, and the first place where the disease broke out, I naturally thought it very likely that they might have got the infection there.

2469. Do you know what became of them after you saw them?—They went away to Rotterdam; I saw them go.

2470. Did you hear whether they had the Cattle Plague?—Yes; I myself believe that the Dutch people may thank Mr. Defries for taking the disease there.

2471. You have not heard of the existence of the Rinderpest in Holland before that date?—Certainly not.

2472. From what countries do most of the foreign cattle come?—Rotterdam, Germany, Tonning, Denmark, Oporto, Spain, latterly from Boulogne in France, and Gottenburg; there are a great quantity from Gottenburg now.

2473. Is there any mode of inspection at these foreign ports of the cattle sent to England?—I believe so; I see many veterinary inspectors' certificates, but I take no notice of them myself.

2474. There is no bill of health shown you when the cattle arrive in England?—I see the inspector's certificate, but I take no notice of it, because there is often found disease of another character which has broken out, and I have had occasion to stop animals which have received a veterinary surgeon's certificate.

2475. Do you believe it possible that animals which you have inspected have had the seeds of the disease in them, and have spread it where they have gone?—I think it quite possible that they have had the seeds of the disease in them.

2476. In the early stages of the disease?—In the incubative stage, and not discernible.

2477. As far as your experience goes, the species of inspection at ports is no guarantee to this country that the Rinderpest will not be introduced by foreign cattle?—I think that we should detect disease if the animals came from a diseased district, such as from Russia. I think that the animals would be bought two or three days previous to the exportation, and that we should have them 10 or 12 days on the journey, and perhaps more than that, so that I think that we should be able to detect the disease.

2478. You would not be able to detect it if they came from Holland?—No; unless they had the symptoms, because it is only some 20 hours' passage.

2479. Have you any supervision of other Custom House inspectors at different ports in the kingdom?—Only when called upon by the Commissioners. They generally send me down to the different ports.

2480. Have you been sent down to Hull?—Yes; four or five years ago.

2481. You have not investigated the Revel case?—Not at all.

2482. A suggestion has been made that foreign cattle, instead of being sent alive to the Metropolitan and other markets, should be slaughtered at the port of landing, and the meat sold. Have you considered that point?—I think that that would altogether prohibit cattle coming from foreign countries to England.

2483. Why do you think so?—I think that by having the cattle slaughtered there the parties would

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lose so much money by them that they would not think it worth their while to send them.

2484. Would they be detained as long as they are now, supposing they were slaughtered on the spot ?—We have only had one or two cargoes detained since I have been appointed in London, with the cattle plague or the typhus fever. If another cargo was detained, I think that the parties would leave off sending them.

2485. At present I suppose there is no accommodation at the landing-places for the slaughter of cattle ?—Yes ; at my station there is plenty of such accommodation.

2486. To any large extent for the purpose which I have mentioned ?—Yes ; at Brown's Wharf I should think that they could kill from 150 to 160 cattle a day. There is one slaughter-house there.

2487. We have heard that the foreign trade in cattle is a very delicate one ; that cattle are brought to a certain point in North Germany, where those who have charge of them receive directions as to whether they shall proceed to Paris or London, according to the price of meat in those places. It is rather supposed that the price of meat would rise here if any measures checking the circulation of cattle were adopted. Would not that attract foreign cattle ?—I think not ; I think that most of the foreign animals come to the port of London. It is only in a few instances that you find that the Harwich people try to get the trade to Harwich, and it seems that when the animals come there it is only a few cargoes ; the port of London has the preference.

2488. The suggestion has been made that there should be a market for foreign cattle, with accommodation for slaughtering them on the spot, at Blackwall? —I am of opinion that it would stop the importation.

2489. Is the trade in foreign cattle confined to the east part of London, or is it pretty general ?—I think that the greatest quantity of foreign cattle for butchers are slaughtered in the east and west parts of London. Many of those beasts are fit for the west as well as for the east ; they are of good quality.

2490. (*Viscount Cranborne.*) How many assistants have you ?—I have only my own. The one appointed by the Board is not an assistant, but is the same as I am myself. Mr. Holmans is appointed at the upper station and myself at the lower station.

2491. You said that during two days last week about 8,000 animals had come in ; did you inspect all those beasts ?—No ; there were three of us ; myself, Mr. Holmans, and Mr. Moss.

2492. How many working hours in a day are there at this season of the year ?—From daylight till dark ; from 6 o'clock till about 5 now. In summer time from 3 o'clock in the morning till 9 or 10 at night.

2493. Do you inspect each animal separately —? We endeavour to get to the vessel while the animals are being landed, and we go through the examination as they pass along ; we then have them all tied up, the beasts in particular, and the sheep and calves in their proper place ; we then go through them again, and have them all led out one by one.

2494. Supposing it was ordered that no animals which were brought to the Metropolitan Market should leave it again, but that all brought there must be slaughtered in London. I suppose that that would not have any injurious effect upon importation ?—Not to the Metropolitan Market, because they would be sold there previously to being slaughtered.

2495. Are many animals brought in like those of Mr. Defries, with the intention of being sent back again if a certain price is not obtained ?—Certainly not. I think that it is the fault of the salesman in allowing them to be sent out of the market without being sold. I should think that he would sell them for the best price, as he must know that if they are sent out of the market a second time they will generally lose value.

2496. Where do the cattle land in the port of London ?—They are landed at Fresh Wharf, Brewer's Quay, St. Katherine's Steam Wharf, the Dublin Wharf, the Aberdeen Wharf, Brown's Wharf at Blackwall, and the Brunswick Wharf.

2497. Is the mass of the importation of cattle to the port of London ?—Yes.

2498. By far the greater quantity ?—Yes.

2499. If the importation were confined to the port of London do you think that it would injuriously diminish the import to this country ?—I think not. I think that last year there were about 500,000 in the port of London to 200,000 in other places. Of course I cannot give that correctly.

2500. (*Dr. Parkes.*) Referring to the case of the cargo which arrived upon the 6th of September, and the cows which were taken ill, can you give us the dates definitely how long the cows were taken ill after exposure ?—I think that on the twelfth day afterwards symptoms of the disease were shown. On the thirteenth day there were decided symptoms ; on the 14th day there were the second and last stage.

2501. What was the length of time at which the symptoms appeared after the last exposure to the chance of infection ?—It would be about the twelfth day ; it was about twelve days before the symptoms were shown.

2502. That was as to one of the animals. What was the time as regards the next one ?—Somewhere about the same time.

2503. And how was it as respects the cow which calved ?—She calved down within some four or five days after she landed, and I think that it went on for about 20 days ; it was 20 days from the time of the first infection.

2504. They were mixed together ?—Yes ; and she went on extremely well for many days.

2505. We cannot draw any conclusion in those cases as to the time of incubation ?—I think not.

2506. What are the early stages of the disease ?—We find dulness and loss of appetite, and coldness of the horns and extremities, and separating themselves from the others.

2507. Would those symptoms be distinctive in this disease ; are they not common to many other diseases ? —Yes ; but then we find other symptoms come on rapidly afterwards. Those symptoms which I have mentioned would not warrant me in stopping the whole cargo. I should have the symptoms thoroughly developed.

2508. If the animal merely presented those symptoms, what would you do ?—I should detain the whole cargo for six or seven hours, if I saw any symptoms of disease.

2509. What is the first positive symptom upon which you think it your duty to detain the whole cargo ?—The first symptoms would be the lapping of the ears, quickness of breathing, coldness of the extremities and of the horns, and leaving off chewing the cud ; and in the cows the secretions.

2510. Those would not be very early symptoms ?—No.

2511. Did I rightly understand you to say that you and your assistants inspected in the two days 8,000 cattle ?—More than that.

2512. How much time do you give to each animal ? I employ from daylight till dark. Yesterday we had seven vessels up, and we were there from half past six in the morning till half past four in the afternoon.

2513. Then you must inspect several animals in the course of a minute ?—Yes.

2514. Then how could you detect symptoms ?—From the general appearance of the animal.

2515. Your inspection must of course be extremely imperfect ?—I think not. If the animals come from a diseased district,—if they come from Rotterdam, where we have had disease, I should take longer time ; but in other cases we of course do it superficially.

2516. What is the general condition of the vessels ? —Very good ; they are thoroughly cleansed every voyage ; they are washed, and disinfectants are employed.

2517. What disinfectants?—I think that some of them use chloride of lime; others use chloride of zinc.

2518. Do you think that the animals are well treated on board?—I think very well; they are sometimes a little over-crowded.

2519. When you have been on board you have seen nothing objectionable?—Nothing at all.

2520. When you have gone down between decks before the animals have been landed, has the air been extremely close?—If they are lying out at anchor, or at the buoy, for any length of time, the air becomes very close, so that it is advisable to unload them directly on getting alongside the wharves.

2521. Is it very hot and disagreeable?—Sometimes particularly so.

2522. So much so that you have any difficulty in going in?—Great difficulty at times, when they have been lying out in the river for some time.

2523. The air has been very bad?—The air has been very bad sometimes in some vessels, and the others are not so bad.

2524. What is the length of the voyage from Oporto?—I think about five days; sometimes longer.

2525. And from Tonning?—36 to 40 hours.

2526. And from German ports?—About the same time, if they are quick vessels.

2527. (*Mr. Read.*) On board all these cattle ships are there plenty of means of carrying water?—No; only in tanks.

2528. Do you suppose that there are proper supplies of water?—I think that the long passage steamers from Hamburg, Tonning, Spain, and Oporto all carry water.

2529. You think so?—I am sure of it. From Rotterdam, Boulogne, and Ostend I do not believe that they do.

2530. How often do they water the animals coming from Oporto in five days?—Twice a day. They have drovers with them.

2531. In rough weather is it not impossible to water cattle?—I think not.

2532. You have said that a quantity of cattle came in yesterday bruised, and some with their legs broken, and some smothered?—Two, I think, were smothered.

2533. Is that of common occurrence?—Yes, when over-crowded.

2534. From being over-crowded, or from rough weather on the passage?—I rather think that it was from the passage, because they were so many hours after their time; they were 12 or 15 hours longer on their passage.

2535. I suppose that you take no notice when vessels are over-crowded; it is not part of your duty?—It is not part of my duty, but I do take notice of it, and sometimes I complain of it; and I think that we can generally tell from the way in which the cattle come in; they come in far better when they are not over-crowded than when they are over-crowded; the mortality is less.

2536. Do you not think that it would be desirable to have a regulation that a certain space should be allowed for each bullock?—I think so. I am now trying to gain that space. I have gone round to most of the shipowners.

2537. What do you call fair space?—It is according to the size of the animal; for large cattle we require somewhere about two feet in width, and for smaller cattle about one foot nine inches.

2538. Of course they would be packed as tight as apples are packed in a basket?—They ought to be packed close, and more particularly in the winter time. When we expect heavy gales, or windy weather, the cattle are packed so that they cannot lie down, and they come over much better. The drover always has to be down in the hold, so that when an animal gets down he may get him up as soon as possible.

2539. How many cargoes have you stopped in the last seven or eight years?—I have stopped several cargoes with exzema. Last year, in the House of Commons they wished to be a little more lenient, and they only ordered us to take away the unhealthy from the healthy, and to deliver the healthy, and have the others killed; but there were several small cargoes with exzema.

2540. Why do you stop them?—Because it is a contagious disease, and when we do have them we have them very bad; with the feet off.

2541. With the claws off?—Yes.

2542. Then they have had some considerable drift as well as the voyage?—No; I think that they are shipped in a diseased state, and the parties are satisfied at times to have them slaughtered.

2543. (*Professor Spooner.*) You have stated, in answer to Dr. Parkes, with regard to the earliest stages, certain symptoms; might not those symptoms show themselves in other diseases?—Yes.

2544. So that by the observance of those symptoms now you only conclude that it is a case of Cattle Plague in consequence of the prevalence of that disease?—I think not; I do not say that. I think that when we have these symptoms themselves of the Cattle Plague it is very discernible to the eye of a veterinary surgeon; but as to fever, such as the opening of the mouth and the running of the eye, and the discharge from the mouth and nostril, we should have decided symptoms of the disease.

2545. But those are not the earliest symptoms?—Of course not; but if I found symptoms of any fever, or of any contagious nature, I should detain those animals until I was satisfied.

2546. But in fact there is nothing special in the earliest symptoms which you have named?—Nothing.

2547. They may show themselves in any other disease?—Yes.

2548. From the period which you have named as regards the incubative stage of the disease I presume that numbers of cattle may come over to this country, and may be affected with the disease in that stage, and you may not discover it at all?—Yes.

2549. It may show itself one or two days afterwards?—Yes. If the voyage was only 20 hours, and another voyage would be ten or twelve days, I consider that we should not have the facility of finding out the disease in the lesser time as we should in the greater time.

2550. Therefore you would admit that your inspection cannot be effectual upon that point?—I think that it has been effectual, because, supposing that the Cattle Plague was in Rotterdam or in any other place, with the exception of Russia, it is proved positively that our inspection is of a sufficient character.

2551. In enumerating the primary symptoms you have said nothing about the evacuations; what have you to say with respect to them?—In my experience that occurs invariably in the last stages; that is in the way of dysentery.

2552. Take the alvine evacuations in the earliest stages; does not the animal give any evidence of the disease by an alteration of its evacuations; is there not constipation?—There is constipation in the first stage of the disease and in the second stage. In the last stages we have diarrhœa or dysentery.

2553. Do you find that the animal evacuates its fæces more frequently than in its healthy or normal condition, and that there is a smaller quantity?—Undoubtedly.

2554. And is it more consistent; more tending to constipation?—Yes; up to the first and second stage; in the third and last stage I think dysentery ensues.

2555. Have you made any observation as to the pulse of the animal under these circumstances?—We find that the pulse is quickened and of an inflammatory character.

2556. Of course you have observed as to the normal pulse of the cow. As a rule at what would you average the pulse of a healthy cow?—I think that it is somewhere abont 45 to 50; it is different from a horse; it is about 38 to 40 in a horse.

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2557. Have you frequently examined as to the pulse of a cow after the animal has been disembarked, and become quiet, and is not under excitement?—Do you mean when having the disease?

2558. Yes?—No, I have not.

2559. But you say that when affected with the disease you have examined the pulse, and have found it quickened?—Yes; but in the last stage I have not, because then I have not cared to touch the animal in any shape.

2560. You have not said anything with regard to the state of the skin as a primary state of this disease?—We find the coat turning. At times we find emphysema, but not at all times.

2561. As regards the temperature of the skin; what is it?—There is coldness all along the spine.

2562. (*Dr. Playfair.*) With all the care and watchfulness which you have now added to the inspection from the fear of the disease, do you think that it is sufficient to prevent diseased cattle entering the country?—I think so.

2563. Are you aware that five Dutch beasts with the plague were seized in the market this morning? No.

2564. One freshly imported this morning, and four which had been in the previous market?—Of course I cannot be accountable for those which had been in the previous market; but I myself have not examined any from Rotterdam this morning.

2565. But they would be examined by your assistants?—No; they may be examined at Harwich or Thames Haven.

2566. But they entered the country in a diseased state?—Yes; but they might have been here some days, and have been turned out in a field, or have come up in an infected truck.* We kept the beasts from the "Maas" on the 6th September, before they were all killed, they also kept the beasts at Harwich, in quarantine, some 14 of them, and no disease showed itself. I consider that from Rotterdam we are perfectly safe from the disease; that arises partly from their examination and partly from the law of the country, that they shall not allow anything to go near where the disease has broken out.

2567. When you saw Mr. Defries's oxen infected you ordered them to be slaughtered?—Yes; because I saw exzema, and also fever.

2568. You suspected the plague?—I did.

2569. Did the Board of Customs telegraph to Holland to say that a cargo of diseased animals were going over to them?—No; because I never told the Commissioners of Customs of it.

2570. But do you not think it very desirable for one country to protect another from the importation of diseased oxen?—Yes; because I think that exports ought to be protected as well as imports.

2571. But you have at present no authority to examine exports?—Not at all.

2572. (*Mr. Lowe.*) I understand you to think that inspection affords sufficient security for the non-introduction of this plague from foreign animals?—I think so.

2573. Can you really say that upon the importation of so many thousand animals in a day you can give a sufficient inspection so as to be pretty sure that none of them have the disease?—Yes; I have done so for the last 21 years, and I believe it to be a matter of impossibility to be stricter than I am.

2574. You think it sufficient?—Yes.

2575. Bearing in mind that the presence of a single diseased animal may have the most dreadful consequences?—If the disease is in the system of course you cannot see it; but where there is no disease I think that the examination is perfect.

2576. Against the disease in its incubating stage the examination is utterly powerless?—Certainly.

2577. And therefore we must not rely upon it to get protection against that; but in its advanced stages you think that it is a full protection?—Yes; we have power to detain until we are perfectly satisfied. I have many times detained animals for six or 12 or 24 hours, and sometimes for two or three days, until I was perfectly satisfied that they were in a healthy state.

2578. How many beasts pass you in a minute?—Not one, I should think.

2579. In the case to which you have referred, how many beasts did you inspect in a single day?—8,000 odd in two days; but then there were three of us. There were 2,989 beasts, 5,464 sheep, and 324 pigs. The beasts are larger in magnitude, and some of the sheep are merinos, and the merinos are turned on their backs, and it takes a little more time.

2580. How many hours did it take you to inspect those 8,000 odd animals?—We began yesterday morning at half past seven, and I was there until nearly dusk; from half past seven till about half past four.

2581. That is nine hours?—Yes.

2582. The time on both days was 18 hours?—Yes, about that time. It takes two or three hours to land them, and then we see them gradually go through our hands, and we then walk round them. If I examined horses I could examine two or three in a very little while.

2583. How many of you do this?—Three of us.

2584. Is the attention of all three directed to the same animal at the same time?—No; perhaps my assistant might be at one place, and I might be at another. They are tied up, and they are sorted, and you may go through beasts and sheep perhaps twenty times in the period. Each bullock, and each sheep, and each pig, and each calf has marks, and they are sorted by the drover, so that perhaps an animal passes our eyes two or three times.

2585. So that each of you would have to inspect about 150 in an hour?—Yes.

2586. And you think that that can be done?—Yes.

2587. But you said just now that you took a minute to each animal; was that confined to the beasts?—We can pass sheep much quicker than we can bullocks.

2588. You think that you and your two assistants, working at the rate of two a minute, can fairly inspect so as to insure the public against this pest, and that that is a sufficient precaution?—I think so.

2589. Do you consider that your assistants are as trustworthy as yourself?—I believe so. I have no reason to say to the contrary.

2590. You said that you had sent a beast back which had been ill, and recovered?—It was kept for the proper time of quarantine, and before the quarantine was out it was taken ill with the disease, and got well.

2591. What is the time in which the disease ceases to be contagious where an animal has had it?—I should say some 10 or 12 days afterwards.

2592. How do you get that information?—By my own opinion.

2593. Are you a veterinary surgeon?—I am.

2594. Upon what is that opinion based?—Upon my knowledge of other animals in the country.

2595. With this disease?—With this particular disease. I have seen some hundreds in the country.

2596. Has there not been rather a short time to form an opinion upon the subject?—I think not; several of the animals have been cured. I believe that nature has done the most.

2597. It is a question not of curing, but of giving the disease to other animals?—If an animal recovered from the disease I should certainly think it fit to be delivered in 10 or 12 days after the subsidence of

* The witness subsequently furnished a statement from the salesman to the effect that these beasts had been landed at Harwich, and had been 12 days in London, and stood twice in the market.

the disease, after being thoroughly cleansed, and being kept away from the unhealthy ones.

2598. Is that the general opinion of the profession?—I cannot say.

2599. Is it not a very important point?—Yes.

2600. You have not had any consultation or advice upon the subject?—Only my own advice in the case of the cattle which I have attended with the disease.

2601. You say that if we required the foreign cattle to be slaughtered in the market where they were sold, it would prohibit the importation?—Not in the market; if they were sold in the market, and then killed, well and good; but if you compel the foreigners to kill upon the spot where they land, I think that the result will be to prohibit the importation of the cattle.

2602. Suppose that at Blackwall or any other suitable place upon the Thames where the foreign cattle were landed, a market was held, it being provided that they should be killed before leaving, what would be the result?—I think that it would prohibit their being imported.

2603. Why?—Because they like a public market.

2604. Would not it be a public market?—I think that they like to have the home animals and the foreign animals together; the foreigners would rather keep their cattle separate from the home cattle, and have a market such as the Metropolitan Market, one part for the foreign cattle and the other part for the home cattle; but by detaining them, and having them killed at the place of landing, I think that it would prohibit the importation.

2605. If there were two markets, one for the foreign cattle and the other for the home cattle, it being provided in both that the cattle should never leave alive, do you think that it would stop the importation?—Yes; I think that they would not like two separate markets, keeping the foreign cattle away from the home cattle.

2606. What would be the effect of it?—Very great.

2607. It would raise the price of meat to the public?—Yes; to a great extent.

2608. That is because the present price of meat would not pay the foreigner?—I rather think that it would interfere with the foreigner. He would say, "I bring cattle here, and have not the same privileges "as others in the market; but let us sell fairly both "foreign and home cattle in the same market."

2609. Do you think that if all cattle instantly upon entering the London market were to be killed it would affect the foreign trade; both home and foreign beasts being obliged to be killed?—I think that there would be no objection to that; I think that the foreigners would like it; they only want fair play.

2610. Would they not get fair play if they were put into a separate market?—I rather fancy not.

2611. (*Professor Spooner.*) But if the same regulations obtained in both markets as to slaughter, it would not have any effect in depreciating the cattle?—It would in buying the beasts. Most of the meat salesmen go into the market, and buy; they go from one foreigner to another, and to the home market, and thus they gain the price of the market; but that I think they would not do if the markets were separate.

2612. You think that it would be an inconvenience to the buyers?—Yes.

2613. (*Mr. Lowe.*) I suppose that what the foreigners fear is that there would not be the same competition of buyers for their beasts?—Yes.

2614. (*Viscount Cranborne.*) What are the symptoms which attract you when you look at the animals in this cursory way; you cannot see whether the animals horns are cold?—If we had any symptoms from which we thought that an animal was diseased, we should have it minutely examined as to the coldness of the horns, and all other symptoms. If a man is capable as regards his professional knowledge, he can tell by the expression of the eye, and the mode of gait, and the animal's hair, and the way in which it goes; we can tell within a little whether it is healthy or not, the same as I might do with you, gentlemen. I could tell to a certain extent whether there was any disease going on, such as lung disease or pleuro-pneumonia, or this Cattle Plague, or cholera, or anything of that sort. The expression of the eye gives you the whole.

2615. Then it is one of these general symptoms, consisting of the expression of the eye, and so forth, which you look for in the examination?—We judge from the expression of the eye and the general gait of the animal whether the animal is perfectly healthy, and if we have any idea that it is not we have it taken on one side and thoroughly examined.

2616. Have no cases of Rinderpest been known in which that expression of the eye has been wanting?—I think not; I think that the eye will show you to a very great extent. All I can say is, that the foreign cattle are particularly healthy, and it seems a matter of great doubt whether the disease has been imported here by the Revel case (for I find by my books that on the 4th of June 1860, 20 oxen were imported from St. Petersburgh in the ship "Wesley," consigned to Baron Rothschild), or whether it spontaneously broke out.

2617. (*Mr. Read.*) You have seen several cases of this Cattle Plague?—I have seen some hundreds. I have attended to a great many.

2618. Have you a good country practice, where you can see these cattle?—Yes; a very large practice, both town and country as well; but I did not care much about the country practice until this Cattle Plague came on, and I had many friends where I was living to send for me in all quarters to go and see the animals. When I was down at Harwich I went to a person of the name of Charles Glover, at Bentley in Essex; there I could distinctly see that the sheep are as liable to the disease as the bovine animals; there I had ocular demonstration.

2619. How many beasts and sheep came in the seven vessels which were disembarked at the port of London yesterday?—I can hardly tell you that, because I have put the nine together, but I can let you know.

2620. Yesterday must have been a very busy day? Yes, particularly so. It is very seldom that it happens that way, because the most of these boats were due on Saturday, and the other boats were due on the Friday, therefore it was from the rough weather, and the fog, and the wind, and so on, which caused us to have so many all on one day.

2621. If nine vessels brought 8,000 head of stock, I suppose that we might consider that the seven would probably bring 6,000?—In saying 8,000 you must put down the larger size as well as the smaller.

2622. I suppose that we may consider that something like 6,000 or 7,000 arrived yesterday?—Yes; and in speaking of those cases which came in yesterday there were four vessels from Tonning, and I believe, without fear of contradiction, that they are as healthy beasts as we possibly can have. I never have had occasion when they have been killed, and a post-mortem examination has been made, to find anything the matter with them, except that they have been bruised. They are very particular there; they will not allow any improper exports, or anything like it.

2623. During nine hours yesterday you and your assistants had to inspect 6,000 or 7,000 head of cattle and sheep?—Yes.

2624. I hope you had some lunch in the day?—No.

2625. (*Viscount Cranborne.*) Do you think that your inspection was as energetic towards the end as at the beginning?—It was very hard work.

2626. (*Mr. Lowe.*) You have two assistants who are veterinary surgeons?—Yes.

2627. (*Chairman.*) Is there any other point to which you would like to call the attention of the Commission?—I have suggested many things to the Commissioners of Customs. I should like peremptory orders to have ships thoroughly cleansed, and that as

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soon as the cargo is delivered the ship should be thoroughly washed down and disinfectants applied; and the same with regard to slaughter-houses.

2628. There is no alteration in the mode of inspection which you would wish to suggest?—I do not see that we can have anything better in the way of inspection, because if any animal has the disease or symptoms of the disease it is stopped. That is where they find so much fault with the port of London.

The witness withdrew.

Professor J. Gamgee.

Professor JOHN GAMGEE examined.

2629. (*Chairman.*) You are a member of the Royal Veterinary College?—I am a member of the Royal College of Veterinary Surgeons.

2630. And also head of the new Albert Veterinary College?—Yes.

2631. Have you studied the subject of the cattle disease?—I have.

2632. Will you state to the Commission whether you are satisfied that the disease now in the country is that which is called the Rinderpest or steppe murrain?—I am perfectly satisfied as to that.

2633. And also that it is highly infectious?—Decidedly; it is a pure contagion.

2634. Will you state what you believe to have been the origin of the disease in England?—I consider the origin of the disease in England to have been due to the importation of infected cattle from Russia.

2635. Will you state your grounds for forming that opinion?—My grounds are twofold. In the first place we know (at all events scientific men accept it as the truth) that the disease could not reach any country beyond Russia, except by direct or indirect importation from that country; that is established by the history of many outbreaks, through the manner in which the malady is suppressed in parts distant from Russia, and that is especially contrasted with the constant prevalence of the disease in some portion or other of the Russian dominions. Then a second reason why I consider the disease to be imported is this. For many years we have never imported stock direct from Russia. Whatever Russian cattle have reached us have come through Prussia or Austria, where they have been subjected to a system of quarantine, which has effectually prevented the communication of the disease through them to this country. I, several years ago, made special inquiries as to the chances of a direct importation from Russia, and in speaking to some of the great cattle importers they assured me that so soon as the direct importation would pay they should of course engage in it. At that time I made, I believe, some communications to the Government, but I specially wrote to the public papers, declaring that we should get the cattle plague through the Baltic, for I had reason to believe that the disease would come here if we had any importations from Memel or any of the Baltic ports. Now it is remarkable that the very first cargo which did arrive was followed by an outbreak of the disease. The question then arises, was that stock healthy, or did it come from an infected country or district, and was it the stock which communicated the disease here.

2636. We should like to have your evidence upon the question, whether you traced any direct communication from these animals to animals suffering with the rinderpest?—No. The evidence which I have is this: I have seen all the papers, and have seen papers from persons in Revel, which prove that at all events some animals did not come from Esthonia, which was somewhat free from the disease, but a certain portion came from the interior of Russia. That strengthened my belief that they were coming from an infected country, and then I searched for information with regard to the stock which communicated the disease, and I could trace nothing more than that some oxen, supposed to be Russian oxen, were seen sick on the 14th of June. Certain it is that in the London dairies the disease was among the cows, which caught the disease I believe in the Metropolitan Cattle Market.

2637. Will you state to the Commission any information which you have to prove that these animals which were put on board at Revel came from an infected district?—The information on that point is incomplete. Forty-six animals were brought over through St. Petersburg to Revel to make up the deficiency of those supplies in Esthonia. Of these, only 13 were chosen. I have seen an account of the cargo in the agent's own handwriting.

2638. Who was the agent?—Clayhills and Son, I believe, in Revel.

2639. Did those 46 animals come from an infected part of the country?—They came, so far as I can ascertain, through St. Petersburgh, from a distant part. Naturally, if they came from Russia, they came from an infected country, because Russia is never free from the Cattle Plague, and not far from St. Petersburg they had the Cattle Plague very severely last November.

2640. How long did this outbreak near St. Petersburg continue?—I cannot say. I begged Professor Unterberger to send me over the most recent statistics as to the Rinderpest, and he has not yet done so. I expect them daily, but he told me that they were not published beyond last May. They are commonly published in Russia from May to May, but they are not very accurate. I drew up some maps for the Government three or four years ago, where I showed that the provinces of Russia infected were even those up towards St. Petersburg, and there is a very broad tract of country where there are yearly outbreaks.

2641. Will you give us any proof that some of these 46 animals coming from St. Petersburg were embarked on the "Tonning?"—I cannot.

2642. We had it stated by one witness that the thirteen animals which came from St. Petersburg were embarked in the vessel, and it was denied by another witness?—I cannot state that.

2643. Who gave you the information?—I got a considerable amount of information from Mr. Burchell; but I tested all that he told me by the documents from Russia, and I read them over carefully. I had a long list indicating the special parts through which these cattle came, and I have the German contract in my pocket under which the cattle were bought.

2644. It is very important to know, first, whether any animals were embarked in the "Tonning" except those from Esthonia; and, secondly, whether, if any from other localities were embarked, they came from infected districts?—Of course we have not had the advantage of looking over them, and investigating the matter. There is one part of the evidence which to my mind is most satisfactory; a butcher had to kill 13 of these animals at Revel; that butcher is named Siehbert. Another animal died in the yard, and Mr. Burchell assures me that one was sick on the voyage, and that he kept him on brandy and water.

2645. (*Viscount Cranborne.*) But that one recovered?—Yes; and I understand was sold for 11*l.* in Hull.

2646. After the animals were landed in Hull did you take any pains to trace them up to their final destination?—Yes; I made some inquiries. I could not make any inquiries in Hull. I made some inquiries in London, and from what I could understand I believe that 172 were brought to London; 30 of these I traced to Mr. Baker, who is a Government contractor; I believe that he was one of the importers. There were three men connected with the thing, Mr. John Hönck, Mr. Baker, and Mr. Burchell. Mr. Baker, I believe, took 30 at once; but these animals, I understand, were not all sold off that day, but appeared in the market for two or three days in

succession ; I cannot say how many days, but I am told that these animals were seen in the market more than once.

2647. (*Chairman.*) You never were able to trace them up to any animals directly affected with the Rinderpest ?—No.

2648. (*Professor Spooner.*) When you say two or three days in succession, you mean succeeding market days, and not consecutive days ?—Just so.

2649. (*Chairman.*) How long after the presence of these Russian cattle in the markets did the Rinderpest appear in England ?—The earliest time that I have heard of its appearance was the 14th of June. Diseased cattle were seen with the present disease, which was afterwards recognized by persons who saw it as decided Rinderpest, on the 14th of June.

2650. Can you give us particulars as to those animals ?—I can give you particulars with regard to the 19th of June, for I saw the cheque which was paid for two cows, which were evidently infected ; for one of them was seized severely on the Saturday ; the two were sold at one date, and communicated the disease in Lambeth Walk.

2651. Whose property were these cows ?—Mr. Carvell's. This occurred in the course of these inquiries. I am always particular not to trust to the people saying that they bought the animals on such a market day, because of course they very soon forget the week ; and I asked him to show me his cheque book, and he showed me his cheque book. He paid for the cows on the day that he bought them. He bought two Dutch cows on the 19th of June ; one of these was sick very shortly afterwards, and by Saturday morning it was very ill ; that would be the 24th. Those two cows communicated the disease to one of his sheds, and 12 of the animals died ; the two were put with 12 others, making 14 in one shed ; and the 12 were either partly disposed of or slaughtered ; the majority of them, however, were slaughtered. He had another large shed with a lot of cows in it, and that shed was preserved from the fact that the sick animals never went near those in it. At all events it was preserved for a certain period ; but I believe that he has since sustained very serious losses.

2652. Where did he purchase these two animals ?—In the Metropolitan Cattle Market.

2653. Were you able to trace them further than to the possession of this person ?—I have the name of the man whom he bought them from.

2654. Perhaps you will get that information ?—I shall.

2655. What reason have you to think that on the 14th animals affected by the disease were in the Metropolitan Market ?—On the very first day that I made inquiries with regard to the rinderpest, on the 29th July, I went to Marylebone, and I cross-questioned the dairymen very carefully as to the period when their cattle began to die, and through some of the most intelligent men, the names of one or two of whom I am ready to give you, I found that they had seen animals presenting all the signs of the illness which they had among their cows on the 14th of June in the Metropolitan Cattle Market. I ascertained that on the very first day that I was making inquiries.

2656. (*Mr. Lowe.*) How are you satisfied that this disease is identical with the Rinderpest ?—Because I have seen the Rinderpest abroad, and I have very carefully examined it.

2656a. Where have you seen it?—In Hungary. For many years I have been acquainted with the pathological lesions of it, not only from the writings of others, but from examining specimens in foreign colleges.

2657. You had a thoroughly good knowledge of it before this outbreak ?—Yes.

2658. And it coincides exactly, does it ?—Yes.

2659. Is there any difference ?—None whatever. When I say no difference, it is very strange that the disease presents singular symptoms in different countries. I have seen cases in Hungary where the animals manifested in the early stage very severe symptoms ; twitchings and even delirium. I have seen an ox roar out as if he were rabid, and I believe that they have more of the nervous phenomena in the cattle of the steppes, and in the Hungarian oxen than here ; more twitching, and more evidence of the paralysis at the end of the attack. In this country too we notice very singular symptoms as to the course of the disease in different parts of the country.

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2660. I suppose that you expect à priori that the disease would be modified in some degree by the climate ?—It is more modified by the breed than by the climate, as far as we can learn. The Russian cattle are affected with a mild form of the disease, and all others with a very virulent form.

2661. Have you no apprehension that it may have come from Hungarian cattle ?—None.

2662. Hungarian cattle do find their way here, do they not ?—Yes.

2663. And there always is rinderpest in Hungary ?—Yes ; there has been for many years past ; but the Hungarian cattle are not fattened up very much in Hungary for the London market. We have, perhaps, more from the Tyrol and from Prussia; and indeed the Austrians would not allow of any traffic from a place where the Rinderpest existed.

2664. Your ground for not expecting it from the Hungarian cattle is the greater strictness of the Austrians in not letting diseased animals through ?—Yes.

2665. You are of opinion that the disease commenced in the market, and went from thence to the dairies, and that it did not commence in the dairies, and go from thence to the market ?—Clearly.

2666. Why is that ?—On the ground that it is a specific disease incapable of production from any number of accidental causes which you might combine in the London cowsheds or in any other place.

2667. (*Dr. Playfair.*) Are you aware that the Austrian rules are, that cattle for export are only inspected, and that cattle to go into the interior of the country are put into a quarantine of 21 days ?—Yes.

2668. Then do you think that a single inspection by a veterinary surgeon is sufficient to prevent any animal having the disease from passing into the trucks, and going for export ?—It clearly would not by itself be sufficient had they not the other system of always exercising a control ; any system of inspection otherwise must be futile.

2669. Are you aware that when the cattle are for export, and going by railway, they do not apply the severe system which they do apply for the cattle which are to remain in the country ?—I am not aware of that. I am simply aware that they would not knowingly allow a traffic from a Rinderpest centre.

2670. Are you quite confident in what you state, that these Russian cattle were observed several times in the market, because the owner declares that they were all sold on the 2d of June ?—I of course am only stating what has been represented to me by several persons ; they represent that the numbers upon their horns, or some special marks which the Russians have, were noticed upon them, and that the animals did return.

2671. Have you specific evidence upon that subject ?—No.

2672. In the case of the cattle which you think came from St. Petersburg, how many days would it be before they went from St. Petersburg to Revel ?—I cannot tell you how long it would take ; they were driven in four horse waggons.

2673. It would take a considerable number of days ?—I should suppose so.

2674. Would not the disease have developed itself in that time ?—Very often herds of steppe cattle carry the disease, and it lurks about them without any mark of it, and in that way we frequently have insidious introductions of the disease on the border frontiers.

2675. Are you aware that it has been stated by the importers that there were none of the steppe breed in these cattle ?—They were Russian cattle.

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2676. Have Russian cattle the power of carrying the infection ?—Yes ; the home breeds of Russia have, and when they are in the convalescent state. The disease has been carried by breeds apparently healthy, and that is why the quarantine is so universally enforced, especially upon the Prussian frontier.

2677. Do you believe that if the statement was true that all the animals were sold on the 2d of June, disease not appearing until the 24th of June could have been caused by these cattle ?—Clearly.

2678. How ?—It could have been caused by indirect communication ; for example, by an animal having been in the market on one market day ; it might have been caused on the second or third market day.

2679. Would it not have appeared on some day six or seven days afterwards ?—I have not the slightest doubt that it did appear, though I cannot prove it. I do not believe that the animals affected on the 19th were the first animals which had the disease.

2680. You think that there were previous cases, although there is no evidence of it ?—Yes ; we always labour under a disadvantage in investigations at a distant date in that way.

2681. (*Mr. Read.*) Are you quite sure that this could not be a spontaneous outburst ?—Perfectly certain.

2682. If this Revel case should break down as to its having imported the disease, you have no other idea upon the subject, as to how it could have come into the country ?—No ; I firmly believe myself that it came from Revel.

2683. I think you said that some cases, in all probability, occurred before the 24th of June ?—Yes.

2684. (*Dr. Parkes.*) In speaking of the cattle which were supposed to be ill on the 14th of June, what was the exact evidence of disease which was given to you ? Certain persons saw the cattle diseased, as they supposed, in the Metropolitan Market on the 14th of June, and they described the symptoms to you ?—Yes ; they described the running from the eyes and nose, and the drooping and the general symptoms, which, when they spoke to me they knew perfectly well, from having seen a great many cases in their own sheds.

2685. Were they competent persons, likely to notice all these things ?—Yes ; the cowkeepers become very intelligent in looking after their own cattle ; they become very sharp in detecting early symptoms. They could not give an opinion like a professional man, but we find that they then saw animals with the same disease as that which occurred afterwards in their own sheds.

2686. The animals to which you have referred were two Dutch cows bought on the 19th, and one was ill on the 24th ?—Yes ; those animals must have caught the disease some time between the 14th and the 19th, and that is quite sufficient to pin down the disease to an earlier date than the 19th in point of communication.

2687. But those animals were bought on the 19th ?—Yes.

2688. They were in the market for five or six hours on the 19th ?—Yes.

2689. According to your view that was the only time when they were exposed to the infection ?—The animals might have been exposed at the previous market.

2690. Can you learn that ?—I almost think that we can learn it.

2691. The period of incubation in that case would be only five days ?—Yes, and that is not impossible ; it is rare, but it might be so.

2692. Can you ascertain more definitely about these animals which were ill on the 19th as to their previous exposure in the market, where they came from, when they were imported, and when they arrived in the port of London ?—I will see what I can do in order to get the information up. I have some notes upon the matter.

2693. (*Viscount Cranborne.*) How long do these steppe cattle, and also the native breeds of Russian cattle, carry about the disease in a latent and imperceptible form ?—I am not aware that we have any very definite fact to be able to state the decided period, but I look upon a convalescent animal as at least very dangerous for two months after its attack.

9694. Then no quarantine which did not secure a period of two months would be effective ?—Probably it might not be absolutely effective. It has been found in practice really that a much shorter quarantine is sufficient, and the opinion in Europe is that we should not have the period of quarantine longer than the known period of the incubation of the disorder.

2695. What in your opinion is that ?—In the inoculation cases which I have had it has usually averaged from six to eight days, and not beyond that, I do not believe that you have the period of the incubation of the disease longer than 10 days at the outside, if even so long.

2696. Then how do you account for the fact that animals from the neighbourhood of St. Petersburg have carried the disease for a much longer period than 10 days ?—The way in which these diseases are carried over a long period is from one animal affecting another. For instance, these animals from St. Petersburg would very soon affect animals at Revel, and from there there would be a succession of cases which would keep it up ; and we had a succession of cases.

2697. What cases were those ?—The animals which were seized with illness. We cannot get very definite evidence about them, but we know that every one of these animals on being seized with illness was slaughtered, or died, or was cured.

2698. Have you seen any evidence that these animals were seized with illness at Revel, and were killed on account of it ?—I have seen evidence from agents that they were slaughtered at Revel, and of course they were slaughtered there for a particular purpose.

2699. Were not they slaughtered because they would have been injured on the journey ?—Not, so far as I can ascertain.

2700. Have you not heard that stated ?—I have heard of one animal having broken its back, and other circumstances of that description, but I have heard of no foundation for it. The person who was with the animals denies it. He says that the animals were ill.

2701. Has he given you any account of their illness ?—He knows the Rinderpest perfectly well, and he assures me they were affected with the disorder.

2702. That is Mr. Burchell ?—Yes.

2703. (*Chairman.*) Have you traced the course of this plague in this country ?—I have followed the disease out to a considerable extent, from the commencement, of course ; and the malady in the main, no doubt, has spread from the Metropolitan Market, and from there it has radiated outwards in all directions. The disease, undoubtedly, was communicated from the London Cattle Market to Edinburgh, and through Edinburgh it was propagated over the greater part of Scotland.

2704. Is it your opinion that the disease is spreading at the present time ?—I believe it is spreading more rapidly now than it has done since the commencement.

2705. Do you attribute that to the circumstance that there are other focuses of infection besides the Metropolitan Market ; I mean the country markets ?—Yes, I do. The farmers are now compelled to utilize their food by buying stock ; it is the fact that the season for store stock has now come round, and unless they exercise very great precautions the disease must spread as it is now spreading.

2706. The Government have met the difficulty by issuing various Orders in Council. Could you state to the Commission what your opinion is as to the efficiency of those orders ?—Unfortunately, my observations over the country prove that the orders in Council have not served the purpose that they should have served, and that the disease has spread considerably, and the orders are, to a certain extent, inoperative.

2707. Have those orders, in your opinion, been

evaded?—Undoubtedly they have been evaded to a considerable extent, but where they have not been evaded the orders have been insufficient.

2708. In what respect have those orders been evaded?—They have been insufficient, for the lack of authority seemingly in controlling the movements of stock, and in securing at once the effectual slaughter of animals; indeed the rules seem inoperative. Up to recently we have very commonly found that whenever the disease appeared the infected animals were allowed to move away, and I made a special observation upon this point before the Metropolitan Cattle Plague Committee. It was stated there, by Professor Simonds, that the Government did not see how it could prevent the removal of the healthy cattle, but that the diseased cattle might be kept on the premises where they were found. I have seen a number of outbreaks arise from infected cattle leaving the sheds in which they have been kept, and being conveyed to markets and other places; and there are various ways in which the disease is communicated. For example, the result of my observations in London has led me to this conclusion, that wherever dairymen now follow stringently the Orders in Council they must lose the whole of their stock, with very few exceptions, that is to say, they must lose the money value of their stock, which they might have secured as salvage to some extent, and this of course makes them rather inclined to evade the law. There is a great deal of disease going on in various parts of the country without the attention of the Government inspectors being called to it, and without any measures whatever being adopted, and where measures are adopted, on account of the impossibility seemingly of regulating the proper slaughter of the infected animals, and so on, the disease is propagated and carried through the country. In addition to that, in London we have a very great deficiency of inspectors, and a great want of men to look after the matter; for instance, diseased and dead animals have been seen in sheds for several days in succession. I believe, nevertheless, that, under the circumstances, as much has been done as they felt it in their power to do, but without far more active measures the disease must be propagated as it has been propagated up to the present time.

2709. Can you cite any particular instances of evasion; for it is very important to get such information upon our evidence?—I have known as many as 100 diseased animals, many of them being sent to market, and others slaughtered that were diseased at the rate of four and five a day, and the malady continuing over a space of three weeks or a month in one place; and of course there the Orders in Council are a thorough evil, and no inspector has heard anything of the matter.

2710. It is I suppose the interest of the owners of cattle who have diseased cattle not to declare that they have the disease on their premises?—Of course; and one man has repeatedly himself shown me the cheques for the amount which he has received for his cattle at the Metropolitan Market.

2711. Will you state who that was?—I do not like to mention the name of the person, but he was the owner of the cattle.

2712. A cowkeeper showed you the cheques he had received for a number of diseased animals which he had sent to the Metropolitan Market?—Yes, and sold there.

2713. Can you state what the number was?—Not exactly, but some days he would have sold five, and on other days a dozen; and that same case is now nearly a month old; it is that time since I was last there; and then on one Sunday he had five or six animals himself that were taken to a slaughter-house in Whitechapel with those of his neighbours, and they made up altogether very nearly 30, which were all diseased, and they walked through the town in that state; they were moved about, and of course they discharged their excrements.

2714. Were those animals sent to various parts of the country from the Metropolitan Market?—Where the cows went to I cannot say, but they were sold in the Metropolitan Market. I have traced cattle from the Metropolitan Market to Romford, Chelmsford, and to a number of other markets, Birmingham for instance, and of course we well know that some went to Norfolk. There is a cow dealer in Edinburgh, whom I have known for several years as a man who has propagated disease in all directions, by the purchase and sale of diseased animals, having bought them cheaply. That man came to London on hearing that the disease had broken out, and bought a lot of animals, and by that means communicated the malady.

2715. In that way you traced the disease to Edinburgh?—Yes.

2716. Although the Orders in Council have broken down with respect to live animals that are diseased, have the regulations worked efficiently as to dead carcases?—I am sorry to say that they have worked very badly indeed; and one of the most disgraceful things that has occurred since the commencement of the outbreak has been the condition of the horse-slaughtering places in London. I have been constantly up to Atcheler's, and other places on my way, to look at the Metropolitan Market, and these animals are within a very few yards from the high road along which the cattle go to and come from the market, and more than once have I seen herds of cattle break up the lane, as cattle will do, and diverge from the current along which they are being driven, and go straight into Atcheler's yard, where three or four cows were lying dead from the Cattle Plague. I should think that the best thing would be to provide proper means by which those animals could be safely slaughtered, and got out of the way of the road, for so long as we have such a filthy system as that in existence it is impossible to do anything.

2717. The places to which you refer are the slaughter-houses to which infected cattle are taken?—Yes; that is, the dying cattle; not the infected animals; they go straight up to the slaughter-houses at the market itself. The animals can go into the Metropolitan Market, and they have gone, and if they have been slaughtered they have been slaughtered there.

2718. Will you be good enough to state why you believe that the disease has actually spread from the manner in which slaughter-houses, such as Mr. Atcheler's, are conducted?—They are taken there dead, or to be slaughtered; they are carried there on the ordinary horse-slaughterer's carts, with their heads hanging out, or the head one way and the tail the other, excrement being discharged from the anus, and by that means the disease is communicated.

2719. Have you seen this with your own eyes?—Yes, I have, and not once, but repeatedly.

2720. You have referred to the Metropolitan Market slaughter-houses. What have you to state with regard to them?—On the very first day, Sunday, I think it was the 30th of July, after coming up from Edinburgh, I saw some diseased animals, in the first place, in the lairs at the Metropolitan Cattle Market. I communicated the fact to the Mayor and Corporation of London at once, and then I went down to one of the slaughter-houses. The men there would not let me in, but I managed to get in by paying. I there saw diseased animals being slaughtered, and I have no doubt but that other animals were infected with the malady. However, there were some there that were diseased, and I examined their intestines. But you have there slaughter-houses destined for the slaughter of healthy food near a large live-stock market; and I think we should not have cattle with the Cattle Plague upon them killed there. With regard to the talk of the abolition of the London cowsheds, I think the great thing is to centralize the London slaughter-houses; that, in my opinion, is the most important point.

2721. Are we to understand from you that the diseased animals are slaughtered in the slaughter-

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houses indiscriminately with animals that are intended for human food?—Yes; I have seen them so slaughtered.

2722. With respect to the lairs to which you have alluded, in what condition are they generally?—They have been improving them lately; but until recently, until the month of August last, they had always been in a very bad condition, and there you were always able to find diseased cattle. In fact, on a Sunday, two or three years ago, I took with me Mr. Simon, in order to satisfy him that what I had stated in a report which I had drawn up was perfectly correct,—that you could get any number of specimens of contagious disease in the lairs there.

2723. Are they not under Government inspection at this moment?—At the present time they may be, but I am referring to the condition of the lairs up to a period, say within two months after the outbreak of the disease.

2724. Were not the lairs inspected before the month of August by Government inspectors?—No, certainly not; that is to say, they might call it inspection, but I assert that they were not inspected, and they were kept in a very bad condition; and a singular circumstance occurred on the 30th of July. I walked round, and saw some diseased cattle there. A rather intelligent man stood by, and wishing, if possible, to trace out the history of those animals, I said to him, "What sort of cattle have you got there?" He turned round rather crustily, and said, "I suppose you will very soon want to know how much money I have got in my pocket." Of course he had got an article there that he could not speak of with any propriety, and he would not give me any information. In times past, I have constantly seen herds of diseased cattle in lairs side by side with cows that were going into the London sheds, and other animals; indeed the inspection at that market altogether has been the most ridiculous thing in the world.

2725. Will you be good enough to state whether this state of affairs is still going on, and whether the present inspection of cowsheds and lairs in London is insufficient?—I cannot speak with regard to the present character of the inspection of the lairs or of the market,—not up to the present day; but I have known cases where the inspection has not been complete, although made. I am by no means one of those who would recommend a stringent door-to-door inspection; but I believe that the law is evaded, owing to the peculiar fact that the cow dealers do not see any good that will come from the Government measures, but, on the contrary, great restriction and harm; and they therefore will not declare that the disease does exist. I think that we ought to have, if possible, a system under which it would be for their interest to declare the existence of the disease; you cannot control these things by threatening them with fines, and alarming them with fear of imprisonment.

2726. With regard to the Metropolitan Cattle Market, what observations or recommendations have you to make?—I would say that certainly until recently, or until the matter was taken up lately more actively, and from the moment that special measures were adopted, the Metropolitan Cattle Market always contained, to my knowledge, whenever I was there, diseased animals which were exposed there for hours together, and in that way, of course, any disease could have been propagated through the market.

2727. What was the date of the improvement which you have mentioned?—I cannot remember precisely when, but I know that they put on an inspector at each gate, and they made some changes. I have not been there for the last month or so, but it has been recently; within the last two months or six weeks, I suppose.

2728. Would it be safe, in your opinion, for the dealers in cattle in the country to buy stock in the Metropolitan Market?—I consider that it would not be safe at all.

2729. Have you any remarks to make upon the recent Consolidated Order in Council with respect to limiting the animals that go to the Metropolitan Market to those only which are to be slaughtered; do you approve of that?—I do approve of that very strongly. I should have liked also with that the instant slaughtering of those animals, and not letting them go wherever they might, without the possibility or chance of tracing them in many instances.

2730. In what way do you believe the regulation breaks down?—I believe it breaks down after the cattle leave the market.

2731. Will you explain in what way?—In consequence of the animals being diverted in various ways. I have seen them moved about in various directions; and I see nothing to prevent them from being smuggled away whenever the parties concerned like to do so.

2732. Is it your opinion that the disease is spread from the Metropolitan Market now very nearly as much as it was before the order came into force?—I do not think that it is. I think that the measure has been beneficial, but there is a difference between a measure being beneficial and a measure being absolutely effectual.

2733. In your opinion it is not absolutely effectual?—I do not think it is.

2734. What is your opinion as to the measures taken by the Government with reference to the country districts?—Wherever I see that the Government measures are followed, nothing, so far as I can understand, is done to save the owners from an enormous amount of loss. All that is done is to restrict the movement of cattle, and nothing more, and the result is that if the Government measures are carried out as a rule we find that the animals die from the first to the last.

2735. How would you propose to remedy that?—The proper way to remedy that would undoubtedly be to have a proper national insurance system, by which a certain compensation could be given, in order to make it the interest of owners to declare the presence of the disease, and then, on the appearance of the disease in one animal, ordering the instant slaughter of all the others, without sending them to market for that purpose; that would be a means of saving money to the country and to the farmers, and of preventing the propagation of the disease throughout the land. I have suggested this before, and it is a plan which in my opinion would be perfectly practicable, and easily put into operation, but nothing can be done without Government carrying it out.

2736. The question of an insurance association may be the subject of future inquiry, but on what grounds do you say that it would be an immediate means of arresting the progress of the disease?—Because it would give you a control over the outbreaks without any further difficulty. If we had a substantial national insurance system the stockowners would fall under it, and upon that system the instant that an animal was infected we should know of it, and from that time we could adopt proper measures to concentrate the disease.

2737. How could you make certain that all the stockowners would insure?—I think it would be so palpably to their interest to do so; they would be ruined if they did not do so, and they would have protection if they did; but they will not entertain the idea of any insurance office in which they have not the most perfect confidence. They have been cheated over a number of years to such an extent; they have paid their premiums, and they have not received their salvage as they expected, so that they will absolutely resist any system except one that I believe could be well carried out by the Government.

2738. Are you not aware that many farmers think they could carry out your suggestion for their individual benefit alone, determining not to join any association, and when they have a diseased animal to kill that one and send all the rest to market?—Some do that and some do not, and they require to have it done for them for the benefit of the country at large.

2739. That is by a voluntary contribution to the insurance association?—Yes; I think that provided the Government established a national insurance system, the thing would succeed, and it would not drain the public purse.

2740. You are probably aware that in many counties, as in Northamptonshire, for instance, there have been many local associations got up?—Yes.

2741. You are strongly opposed, I presume, to small local associations?—Yes; I think they must be extended upon a broad area.

2742. Believing that if an outbreak took place within a limited district the assurers would be ruined?—Yes. We have associations now, and they say, "We are not an insurance society;" but they led people to believe that they were at first. In Edinburgh people subscribed; but the truth is that they cannot meet their losses in other counties; they cannot get up mutual associations, in some parts of Scotland, and the farmers have no confidence in them.

2743. You have already referred to the present system of inspection, to the Orders in Council, and how they work. What remedies have you to suggest with a view to stopping the disease at once?—Of course it is an extremely difficult matter to lay down a number of comprehensive rules at a moment's notice; but, in general terms, I would say that the proper way would be to get a control over every outbreak, and slaughter the whole of the horned cattle, diseased and the healthy, and so prevent anything moving off from the place in the shape of live stock, whether they be sheep or cattle, and indeed other animals which may carry the disease. I believe that whenever it is possible they should be slaughtered on the premises, and nowhere else, and not be moved a yard if it can be managed.

2744. Suggestions have been made to the Commission with regard to the stoppage of large fairs and markets. What is your opinion upon that point?—My opinion is that any such measure as that should be carried out direct from London, and that is where the Orders in Council fail, for they leave the vestries and the mayors and the corporations of the various cities to carry out these regulations or not as they wish, and in many cases the result is that only partial measures are adopted on their part, and the country is left unprotected, and that is quite enough to keep up the disease, which is carried from one place to another; one place is protected and another is unprotected, and so it goes on. I thought at first that it was a proper and prudent thing to do,—it is rather late to begin now,—but I thought that the stock markets should instantly have been checked, every one of them.

2745. Would you confine that remark to markets for the sale of store cattle?—No; I would stop every one of them. I would not have one of them held.

2746. Not markets for fat animals?—No. I would have them sold as they are sold now, in many instances, with very great advantage. Of course it is a very difficult thing to do, and it is a great inconvenience, but it would be a more serious thing to lose all our stock.

2747. You would stop all movement of cattle whatsoever?—I would. Of course my remarks certainly do not apply to counties in which there was obviously no disease, for example, in Ross-shire and in Caithness; they will not allow any animals to come in there. In Caithness I know for a fact that there are some spots where the animals might be allowed to congregate; but certainly upon the whole I think we ought to have the movement of the cattle stopped, although it may seem a very harsh measure.

2748. You would carry on the meat trade of the country by a system of dead meat markets?—Yes, as much as possible. I hold that one source of evil which has not been looked at, and which have been attended with serious disaster, has been the admixture of foreign stock and English stock since the outbreak of the disease. I know that Dutch cattle have come into this country that were diseased; cargoes have been brought over here that have been diseased. In some cases after the animals have been found to be diseased they have been thrown overboard, and some have been washed on shore in the county of Kent, and others have been washed on shore in the neighbourhood of Newcastle, and this importation of diseased cattle of course keeps adding to the virus already in the country, and I know not when the disease will cease. With regard to Holland, we certainly should not have imported any cattle from Holland for some weeks past; or we should have another system, which I suggested several years ago, that of having foreign stock markets and foreign stock slaughter-houses.

2749. Will you state your reason for prohibiting markets for the sale of fat cattle ready for the butcher as distinguished from store cattle?—Simply because the animals coming from the farms now, under existing circumstances, can readily travel over the roads; they can travel over any part of the country, and they can in that way discharge the poison, and so communicate the disease to other animals.

2750. Do you believe that the disease can be communicated by railway trucks passing through a district?—No, I do not think it can. Of course if you have a lot of trucks in a siding at a station, and there are pastures all round, then the cattle may communicate the disease; but upon the whole I think the mere fact of transit, and the running of trains through a country, does not have that effect.

2751. Would the same remark be applicable to foreign cattle, and would you stop their being exhibited in the markets?—I would give them markets for themselves. I would have a special foreign stock market. I would not stop the cattle coming over, but I would sell them in special markets. I would have them there slaughtered, and brought into the country as dead meat.

2752. You would create fresh markets?—Yes. The system of inspection at the ports has been useless in preventing the introduction of this disease; the same as in the case of small-pox, pleuro-pneumonia, and the foot and mouth disease.

2753. Then, however strict it may be, it will always be bad?—Yes; in fact it is worse than bad; it gives us the false idea of safety.

2754. Do you consider that the Metropolitan Market is properly disinfected after a market has been held, so that if sound animals came into it they would not catch the disorder?—I believe that great precautions have been taken to effect that end, and I understand that it is really well carried out; it has only, however, been recently done; of course since the outbreak of this disease. I may mention to the Commission that one of the very first things that I did, on ascertaining that the disease was here, was this:—I took upon myself to call some gentlemen together, and we formed an association; we then communicated with the steamboat companies and the railway proprietors, and with the Mayor and Corporation of the City of London, who were very angry at our imputing the spread of the disease to their market, for they thought that every thing was perfectly done, until they came to inquire, and then they found that all we had said was correct, and from that moment the market has been purified.

2755. When was that communication made to the Corporation?—Very early in August; the very week, I think, after I first saw the disease.

2756. (*Viscount Cranborne.*) With regard to a national rate, have you any calculations upon which a table of premiums for insurances could be made?—We have a number of facts upon that point, and those facts are most decided, in relation to other contagious diseases; but of course we should require to calculate rather carefully as to the probability of loss arising from the Cattle Plague after the institution of such a system; but I believe that if the Cattle Plague is allowed to go on the loss cannot be met by any known amount of money, that is to say, we cannot imagine whether it will cost ten millions or thirty millions, if we do not adopt preventive measures. I believe that if we had adopted a system, and have followed out

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the outbreaks closely, we should have have been able to limit the loss from the day that we commenced to not much more than 5 per cent. over the whole country, if so much,

2757. Your idea is, that the payment of 5 per cent. premium on the value of the cattle would put a stop to the present state of things, and leave the public exchequer indemnified ?—Certainly, as to the Cattle Plague alone ; but I believe it would also include the lung disease.

2758. Would you oblige every one to insure, or would you leave it optional ?—In relation to everything connected with the Cattle Plague, I am for really being very severe in insisting upon certain things being done, but I quite understand that that is difficult in matters of insurance ; but I believe that a voluntary system would work, because I think that farmers would have such confidence in it that they would see their interest and the salvation of the country in it. I think that you would have comparatively few exceptions. A poll-tax would be more effectual ; but my desire is that the system should not be a fleeting one, but that it should apply to diseases generally, so as not to have a recurrence of what we have had.

2759. Is the calculation which you have made of 5 per cent. founded upon your general knowledge of the subject, or upon any special data which you can furnish to this Commission ?—It is founded upon this : I know that in countries where the Cattle Plague prevails, and where effectual measures are carried out, even in Hungary, the mortality never exceeds 5 per cent. of the whole stock of the country. Wherever they have adopted means to suppress it, the mortality in the country has never exceeded 5 per cent. It is 90 per cent. very often in some districts; but taking a broad area it does not on the whole exceed 5 per cent. I will take the case of Hungary, apart from other portions of the Austrian dominions, for it is one of the most threatened and most constantly afflicted, and I find that during the last 15 years the loss in Hungary has never exceeded 5 per cent.

2760. Is an accurate census taken of the cattle in that country ?—Yes ; the statistics of the Rinderpest are very accurate.

2761. Can you furnish any of those statistics to this Commission ?—Yes ; I can give the statistics as to the Rinderpest in Austria and in Hungary.

2762. I understand you to accompany the suggestion for a national assurance with large powers to order the slaughtering cattle, both healthy and diseased, to be vested in inspectors ?—Clearly; I quite understand that there might be some objection raised by the farmers against individual inspectors, and that there ought therefore to be a system that would secure that the inspectors might occasionally be inspected and guided in their operations. I think that seems very important, but still, if they are paid for their cattle, there is no hardship.

2763. Would you kill the cattle only of the farmers who insure, or the cattle of all farmers ?—I should propose to kill the cattle of all, wherever the cattle disease infested a herd, and adopt the system that is adopted in Austria, which is, that those who are foolish enough not to adopt rational measures should be the sufferers. I would not indemnify a man if he resisted doing all that was necessary for his own good and for the good of the country.

2764. How extensive would be the cordon that you would draw around each place or district ?—I do not see that you would require any special cordon at all ; the important thing is to let us know where the disease is, and that is a matter which I think has been overlooked ; we require to know where it is ; if we know where an outbreak has occurred we kill it at once there, and there is no necessity for any extraordinary cordon, though it is not desirable to allow much traffic of stock through the infected district.

2765. How far from the point of infection would you kill all animals ?—I would only kill the unhealthy herd. I would not disseminate them in a district among the healthy herds ; it must be done with very great care, and in a way by which we should lose fewer cattle.

2766. Do you think there is a sufficient number of competent inspectors to carry such a system into execution ?—I have often said that the number of our veterinarians is deficient ; but although it is deficient a great deal may be done. A great many men could be procured in various ways by which the thing could be properly carried out. For example, we could carry out the system which is adopted in Australia of appointing scab inspectors amongst the best practical young farmers. It is not desirable, perhaps, unless we are forced ; but certainly we should not have, as we have now, butchers, and tailors, and shoemakers, and men of that class acting as inspectors.

2767. You do not contemplate confining the inspection to veterinary surgeons, but you would appoint farmers ?—Yes ; where I was absolutely forced to do so.

2768. Would the farmers, do you think, like to see their neighbours coming and ordering their cattle to be killed ?—No ; no more than they like the veterinary surgeons ; but you would require to have men who have had a certain training, like the young farmers in this country, who have gone through a certain course of veterinary education. I could point out 40 or 50 in a short time ; men who really have worked at veterinary science a great deal, if they are not absolutely veterinarians, but they have been taught the science at a college ; in the colleges at Edinburgh, for example.

2769. (*Dr. Parkes.*) Can you state the longest incubative period that you have known to occur ?—I think the longest that I have known has been eight days ; that is, that I have traced from the moment I have inoculated an animal to the manifestation of the disease,

2770. But I mean after exposure to contagion ?—I have not known any case longer than eight days.

2771. At what period in convalescence is the danger completely over ?—That is so indefinite that it is impossible to say ; our experiments are by no means so complete as they should be on these questions.

2772. You know of no symptom or certain condition of the animals that would enable you to say that they might be sent among other cattle ?—No.

2773. You spoke, I think, of healthy cattle carrying the disease ?—Yes ; I meant Russian cattle.

2774. Do you mean by particles of the poison adhering to them ?—Yes, of course ; by the poison adhering to their skin, hair, hoofs, &c.

2775. You do not suppose that an animal without something of that kind adhering to its hide could carry the disease ?—No ; unless an animal is healthy in this sense, that it has just had the disease ; and there is still a discharge of poison through which the disease may be caught.

2776. Then a healthy animal carrying the disease about with it might be completely purified from it ?—Yes, perfectly so ; they do purify them, and wash them.

2777. Do you think that perfect washing would properly cleanse any healthy animal carrying the disease ?—Yes, I think so.

2778. I gather from what I have read in your writings that you do not believe in the efficacy of any kind of treatment ?—I do not believe in the efficacy of any specific treatment, but a certain number of animals do recover.

2779. As a rule, what per-centage of them recover?—I do not believe that that question has yet been settled in this country. We have had instances in which 50 per cent. have recovered, and others in which not one per cent. has recovered. We have not data in our possession at the present time to tell us what has been the proportion of animals that have recovered, but I believe that, generally speaking, in an infected district, whether you try methods of treatment or not, the mortality will always vary, although

it is a wide range, from about 75 to 95 per cent.; it is commonly from 85 to 95 per cent.

2780. What would be the causes for the extraordinary difference in the cases you have mentioned, as between 50 per cent. and 95 per cent?—As with every contagious disease, you have sometimes, from some predisposing cause or other, the mortality affected. When first I spoke on this outbreak I suggested that we should use iron extensively amongst our cattle, merely as a tonic, whenever we had a suspicion of the disease being in the neighbourhood, and I have seen among a herd that have had the iron a very remarkable diminution in the severity of the disease; I had in those cases more recoveries, probably, than in others. I have discountenanced the treatment of such animals as much as I could; I do not believe it is the right plan; but there are conditions under which herds are affected with the disease in a tolerably mild form, somewhat milder than usual. What those circumstances are we are not prepared to state.

2781. You see the fact without being able to account for it?—Yes.

2782. You would be inclined to recommend iron as a prophylactic mode of treatment?—Yes.

2783. Is there any other kind of prophylactic treatment that you would recommend?—No.

2784. Any external treatment of any kind, such as applications to the nostrils or to the mouth, in order to prevent the reception of the poison?—No. I know of one instance near Folkestone, where a man did everything that could possibly be suggested in the way of purification and cleanliness, and washing, and tonics; there were sixty animals, but the whole of them died in five days.

2785. He commenced his treatment before the disease commenced?—Yes; six weeks before.

2786. Could you give us the exact details of the treatment that was tried there, and the result?—He did not try medical treatment, but he resorted to preventive measures, and a system of disinfection that had been strongly recommended, and good feeding, letting the animals have a little nitre, and the iron just as a tonic. He tried that system, and he thought that he ought to have preserved them. The stock was of the finest description; a magnificent herd of short horned cows, and the ventilation was perfect; everything was done that the man could think of. I saw the animals on the 13th, when they appeared healthy, and he had not a hoof there on the 18th.

2787. I suppose that abroad they treat them in the same way?—Sometimes when the disease is in a district, and it attains such proportious that the whole of the animals are affected, they allow the people to try and treat them; and there are numerous persons who profess to cure the disease, as they do here. I receive every morning letters containing what is called a cure for the Cattle Plague; but the experience of many years abroad is, that these pretended cures are always failures, and in fact the treatment of the disease in any isolated case, supposing an animal to be absolutely separated from anything else, may be sanctioned, but as a national measure it should unquestionably be discarded.

2788. What do you consider are the best disinfectants; first of all for sheds?—I think that the best disinfectant for sheds is caustic soda and hot water. Chlorinated lime is very good. I have no faith, as a disinfectant for sheds, in Condy's fluid; it has been constantly administered internally, and it seems to keep the excrements in a healthy condition.

2789. You would recommend washing with caustic soda and hot water?—Yes.

2790. What strength of soda should be used?—To be tolerably effectual I should think about 20 degrees Twaddle; I mean of the soda ash of commerce; from 16 to 20 degrees of specific gravity. I think it would require 2 lbs. to a pailful.

2791. (*Dr. Playfair.*) You mean, I presume, as a cleanser, and not as a disinfectant?—My experience is that it is a cleanser. I believe that no kind of animal poison resists it, or would effectually resist it, after it had been used; it is a thing upon which experiments ought to be conducted; but that is my impression.

2792. Have you selected sheds in which animals have been, and applied the soda in the way you would recommend, and put other animals in immediately afterwards?—Not immediately; it is rather too serious a matter,—but it might be tried—the sources of communication are so subtle and numerous.

2793. What would you recommend for the purpose of disinfecting manure?—One of the best things that I know of is carbolic acid; carbolate of lime; that is my impression.

2794. Have you made experiments with it?—Yes. Chlorinated lime is very good, but I object to it in sheds; the chlorine gets disengaged, and torments the animals, and makes them sneeze, and it is very important to keep the cows very quiet; but it is a very good disinfectant.

2795. For the sake of the beasts, what disinfectant would you use?—No doubt one of the best for that purpose in the case of the excrement is chlorinated lime, although a strong solution of soda would be ample for the external parts; for the animals I have used Condy's fluid, giving them that internally in acidulated water. I believe there is a man who attended some animals which I treated in Limehouse, and he is carrying out and has carried out that system; he is one of the men who is reputed to have the greatest amount of success from using Condy's fluid in acidulated water; and at intervals some stimulating agent; methylated spirit has been used very largely. I do not think that we have any antidote for the poison.

2796. (*Dr. Quain.*) Are you personally acquainted with the steppe country?—No; I have never been there. I have been in the steppes of Hungary.

2797. Are you acquainted with the character of the country generally from reading?—Yes; I have read a good deal about Russia, and I have followed the geographical distribution of the disease very carefully.

2798. Have you formed any opinion as to why the disease exists so continuously in those regions?—My impression is that it is kept up by pure contagion, and not spontaneously developed; and the reason is, that there are there broad open plains where there cannot fail to be an intermingling of stock of every kind, and there is every opportunity for it, and it never dies out.

2799. Are no steps taken to prevent the spread of the disease?—Yes; they have attempted in Russia, owing to the restrictions put by foreign countries upon Russian cattle, to adopt inoculation measures. They wish, as Professor Jessen has stated, to inoculate all the cattle. They say there would be no fear then in getting Russian cattle, and in fact acting as we should in the case of small-pox by vaccinating every one.

2800. Has that plan been carried out to any great extent?—Yes, and they have succeeded with their inoculations where they have tried it, but it cannot be carried out as a national measure.

2801. Referring to the Revel cargo, you stated at the Social Science Meeting that three or four of the cattle were slaughtered?—Yes, at Revel; and one died at Revel, and another, I understood, was sick on the voyage.

2802. The impression left on my mind was that you wished to say that those animals certainly died of the Rinderpest?—That is my impression.

2803. You have no authentic information upon that point?—Yes, I have, if it can be relied upon, from the man who had the cattle.

2804. Are you aware that the vessel in which those cattle were brought over was used within a week afterwards?—I am not aware of that fact.

2805. And that no further case of disease has been referred to cattle being shipped in her?—I do not know how they could trace any outbreak of disease to the "Tonning" directly, considering the extra-

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ordinary prevalence of disease which there has been throughout the foreign cattle.

2806. With regard to the future, seeing how liable various parts of the continent are to suffer from this disease, you say that you would have special markets where the cattle should be sold and slaughtered directly?—Yes.

2807. Do you think that would be practicable in very warm weather?—Perfectly so; you can have places where the cattle might be kept for a time; the Essex Marshes, for instance, are large enough, and you might have provision made for feeding them.

2808. That would amount to a species of quarantine?—They are kept here from market to market now.

2809. Do you mean that they should be sold first, and then you would have them killed on the spot, or that you would have the dead meat sold in some public market?—We have a public market for the sale of dead meat, and I would not have a distinct dead meat market for foreign stock; but as to the live stock trade, it is very important to have those animals kept distinct; they must be brought over alive, that we all understand, and they can be brought over alive. There are slaughter-houses here, and I think we should be conferring a great boon upon many butchers if we took those slaughter-houses from them. In an economical point of view the thing should be done.

2810. I thought you stated that you would have a dead meat market for foreign beasts?—If I implied that I did not mean it; not a foreign dead meat market, but a foreign stock market.

2811. (*Mr. Ceely.*) Do you consider that the disease which now exists in England is identical with that which exists in Russia?—Yes.

2812. Does it differ at all in its pathological appearances?—No, certainly not. We have one singular fact bearing out some statistics which I published some time ago as to the enormous losses by pleuro-pneumonia in Edinburgh, that in one part of the country we have it curiously complicated with the lung disease; otherwise we have the same progress and the same manifestations, with some slight variations.

2813. I asked you the question because I have seen drawings from Vienna exhibiting more of diptheritic deposit in the trachea and upon the glands of the intestines?—I have specimens of lymph that has been obtained. I know what it is in Vienna; I have seen quite as much lymph and deposit as they have in Vienna in one case; the intestines were almost free from disease in this country when the windpipe is seriously affected.

2814. They are exceptional cases?—Yes; the dense exudations in the trachea in Vienna are exceptional. I have not found in all the museums of Europe more than one case where there has been this variety of the disease,—a solid fibrinous deposit in the trachea. These cases are not common abroad any more than they are here.

2815. With regard to the disease in the sheep, do you consider that that is analogous or identical?—I have some observations to make as to that. The sheep are undoubtedly affected, and they are especially affected where they are housed with cattle, and where they are closed in within a limited space amongst them. The disease is propagated slowly to them by contagion; in the open air it may not be, and undoubtedly the malady is not of the same fatal character amongst them; the contagion is not so virulent in affecting sheep as in affecting cattle.

2816. It has been very bad in Norfolk, I understand?—Yes; but we cannot be guided by any particular case. I have followed several outbreaks; we have inoculated sheep in the north, and in three cases the disease has not been induced yet; they have been inoculating them in Holland, and the sheep have had the disease afterwards, but they are not so certainly affected; if you inoculated oxen, you know that some will be affected and die, but with regard to sheep they may escape.

2817. They might take it from infection, and not from inoculation?—Certainly; it is possible, but not very probable.

2818. Do you consider that there is any difference in the appearances of the diseased parts of sheep as compared with oxen?—There is a very remarkable similarity; there is more difference observable in the progress of the disease in the animal; sheep revive more rapidly; they go on for two or three days, and recover, and then they get over it; and upon the whole we have not the same fever, or the same virulence, or the same readiness of communication amongst sheep.

2819. A great many cases that I saw in Norfolk were complicated with congestion of the lungs?—I have not seen such cases as those.

2820. That is not common?—No; but had the animals in this case been dosed with anything?

2821. I cannot say?—Amongst flocks of sheep I have found that whenever the shepherds begin to tamper with medicine the sheep suffer tremendously.

2822. You look upon the disease as undoubtedly affecting sheep, do you not?—Undoubtedly; and from time immemorial people have known that sheep would communicate the disease. But, in 1835, the first observation was made in a supposed case of Rinderpest in a goat. Then some other observations were made; but in Russia, in the year 1855, they saw the disease amongst the sheep. It was only in 1860 that Dr. Maresch of Bohemia saw it amongst sheep and cattle which were housed together, and in 1863 he wrote a very admirable report upon it, proving conclusively that the disease had affected the sheep.

2823. No doubt you can account for the late period at which it has been known that sheep were affected. From some causes the cattle and sheep were not brought together?—Clearly. The malady was so universally and justly looked upon as a cattle disease, and it appeared to run such a special course in cattle alone, that the fact of sheep dying seems to have been overlooked at times.

2824. (*Professor Spooner.*) You have expressed your belief that Rinderpest and pleuro-pneumonia are both of them independent diseases?—Yes; both of them.

2825. Have you formed any opinion as to where pleuro-pneumonia was imported from?—We have imported pleuro-pneumonia principally through Holland. The malady has always been kept up in Holland. Holland began to suffer from pleuro-pneumonia when we began to get cattle through Holland. The disease first appeared in the south-east of Holland, and then it gradually spread until it got to Friesland; and we have constantly been receiving infected stock from Holland, as they are now sending us infected cattle.

2826. Is it your opinion that the foot and mouth disease has been imported?—Quite so.

2827. From what country do you think it was imported?—In the outbreaks of that disease that have been so general over Europe from time to time it might have come from almost any part. The foot and mouth disease of the continent could have been easily imported; but the first instance that I think we had of it was in some cattle that came from Holland to Cork in 1838. The Consul at the Hague imported some cattle for breeding purposes, and the produce of that stock is still to be traced there; now, perhaps, in the twenty-fifth generation.

2828. Do you think that all these diseases are infectious?—Yes; both infectious and contagious.

2829. With regard to the present Cattle Plague called Rinderpest, are you of opinion that that unquestionably was first generated in the steppes of Russia?—Yes; I believe that; at all events we know of its having been constantly there, and incapable of generation elsewhere.

2830. That is, in the steppes?—Yes; at all events it is kept up in the steppes. I do not know whether it is directly generated upon the soil of the steppes. There is an absence of facts upon that point, and

there is no doubt that the history as to the origin of Rinderpest in the steppes requires a little working out.

2831. You have spoken of a variety of cattle being herded together in the steppes; is that so?—Yes.

2832. Are not the cattle which are bred in the steppes of a peculiar breed?—Yes; but the German colonists there have breeds of their own. In Russia they have the pure steppe cattle; but a general immunity from severe attacks of the plague seems to be common amongst more than the steppe cattle; in fact, provided the cattle are bonâ fide Russian breeds, they seem, from being acclimatized, to suffer less severely than the others.

2833. Have you discovered any cause for the disease breaking out there, and not elsewhere?—No.

2834. With regard to vegetation or the want of drainage?—No. I have no absolute facts that would warrant me in stating that it was so.

2835. You are aware that the valleys of the steppes are very luxuriant in pasturage, while the hills are bare?—Yes; but I have formed no theory why it should develop itself spontaneously there. I think that it does not develope itself spontaneously there, and that it is kept up, like small-pox, in the world, by repeated recrudescences of the malady.

2836. Where else do you think that it might arise?—That I cannot tell you; but I believe we may class it with hydrophobia and small-pox; not as originating spontaneously in any part of the world, but as being a transmitted disease.

2837. Have you any reason to give as to why it should not occur in this country like any other extraneous disease?—My reason for saying that it would not occur is, that it is a disease totally different in its character and in its development and in its progress from any other known disorder that we have ever had in this country; and then we know that even in former times it has been introduced; introduce it, and you have it; do not introduce it, and you keep clear of it. But we have had causes which were supposed to be capable of generating this malady more severely in operation in former times than now, and they did not produce the disease.

2838. That is, presuming it to be the disease?—Yes; I should think no one will doubt that now.

2839. Does not your experience enable you to say that of late years diseases have arisen in this country which we in former times knew nothing of, and that in fact the type of many diseases is altogether altered?—My views are not quite in consonance with those of a great many others on these points. I believe that diseases have been extensively overlooked, and that we have had maladies which have presented remarkable virulence, but of a very definite character, such as the maladies that Mr. Ceely examined into in Lincolnshire; but those are directly traceable to a definite cause—to the system of farming, to the system of forcing, to rich manure, and to the food which they had, especially in hot seasons. We have had a good deal of splenic apoplexy this year; we know its causes, and we can produce the disease if we please always under certain circumstances.

2840. Have we not this year had an extraordinary season which was calculated to operate upon the vegetation of the country, and probably through that upon animal life?—Yes; but not to produce Rinderpest.

2841. You have spoken of the advisability of not slaughtering animals in the vicinity of animals known to be diseased, although in those animals the disease may not have declared itself?—Yes.

2842. I presume in that case you consider that the meat of the slaughtered animals would be fit for human food?—Clearly.

2843. Do you not think that the system of the animal which has imbibed the disease is in a poisoned condition before the symptoms declare themselves?—No; I look upon an animal having the disease in a state of incubation as a perfectly sound animal.

2844. Have you had an opportunity of examining any animals that may have been slaughtered in which the disease was in its incubative stage, and had not declared itself?—Yes.

2845. Have you not in many of those cases detected morbid lesions existing in the stomach or intestines?—Then they are not in the incubative stage.

2846. If there are no apparent symptoms, must we not say that the disease is in its incubative stage?—I think not; if you speak of a dropping of the ears, and a running from the eyes and nose, as being the earliest signs of the plague, I consider that you have animals 24 hours before those signs appear with the ulcerations you have mentioned; I agree with you in that; but if you will adopt the proper means to ascertain the very earliest symptoms of the disease, you will not find the ulcerations and the morbid appearances.

2847. Practically speaking, might not a number of animals pass under the observation of our inspectors, however clever they might be, and those animals being at once slaughtered, might you not find lesions giving evidence of the disease?—Yes.

2848. Where such evidence of the existence of disease presented itself, should you consider the meat of such an animal fit for human food?—I would let the animal remain hung up for 24 hours, and if it stiffened, and the colour of the flesh was natural, I would allow it to be sold as human food.

2849. What is the result of your experience as to the effect produced by this disease upon the muscular tissues of the body or the flesh?—There is a very remarkable change which occurs in some of the muscular parts of the body which is described as occurring in typhus, viz., a fatty degeneration which occurs very rapidly in animals that live for a few days, as in human typhus, but I do not regard this disease at all as typhus. In some cases the muscles give way, and by the aid of the microscope we find that a fatty degeneration exists, and an obvious change takes place which causes the meat to acquire a dark colour, and to be tougher when boiled; it is not so savoury as healthy meat, but otherwise there are no very special characters.

2850. (*Mr. Lowe.*) What is the effect of weather upon this disease?—I have traced that very much in several outbreaks, and I have found that the influence of weather is really very slight, if anything. I think that upon the whole it is worse in winter weather than in summer.

2851. That is the fact, is it?—Yes.

2852. Can you account for that in any way?—It is propagated with greater certainty in winter owing to the fact that the emanations and discharges do not putrify so rapidly and do not dry up so readily.

2853. In very hot countries diseases become perfectly inodorous in a very short time?—Yes.

2854. With regard to sheep, do you consider that they are a powerful means of spreading the disease among the cattle?—Yes; and one of the very earliest outbreaks that I had to treat in London was traceable to some sheep which had been purchased by a butcher at Brixton in the month of August. I referred to the importance of watching the sheep at the beginning, and I have had several cases in which I believe the disease has been communicated by the sheep.

2855. I suppose you would shut up the market for sheep as well as for cattle?—No; upon the whole I really should not do so, because the disease is far from being at all of the same importance among the flocks of sheep as among the herds of cattle.

2856. Will not they carry the contagion among the cattle?—You would very soon have the contagion cease if the markets were restricted to sheep.

2857. You would merely restrict the markets with regard to cattle?—Yes.

2858. You have spoken of the data upon which the Government could insure the cattle in this country, and that you would derive them from the experience acquired in Hungary?—Not altogether so, because I

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would derive them also from our own observations as to cattle insurance in this country over a long time. With regard to Hungary and Austria, I would specially refer to the observations made in those countries on the Cattle Plague, because the statistics there are most complete; and it is very strange that in Hungary especially the highest rate of mortality from this disease has never exceeded 5 per cent. for the last 15 years.

2859. In a highly contagious disease like this, do you think that you can reason from a country like Hungary to England?—I think that the danger is materially greater in England than in Hungary.

2860. For what reason?—On account of the greater communication that we have maladies spread more rapidly in this country than they do in many parts abroad; but there is this fact to be noted, that we can carry out preservative measures, I believe, more effectually in England than in Hungary.

2861. In what part of Hungary does the disease prevail?—In the plains.

2862. Where about?—In the great plain between Vienna and Pesth.

2863. Not so much east of Pesth?—Yes; they have it a great deal there, and down in Romania they have it.

2864. Between Costendjie and Czernavoda?—Yes.

2865. In the Dobrudscha?—Yes, it exists there, and down at it has been very bad. I saw it not long ago at Nickelsdorf, about three or four hours' journey from Vienna.

2866. Do you think you could obtain some data upon which to estimate the probable loss that would arise, and which you could place in the hands of an actuary?—As to cattle insurance, apart from the question of the Cattle Plague, we could undoubtedly. As to the Cattle Plague, I think we could make a very shrewd guess, quite safe enough for all practical purposes; and if this plan could be adopted an insurance system could be started on the ground of paying and securing a salvage, paying at first only a half, and then in the event of the funds being sufficient to meet the case, paying, say, another third; I should never advise that the whole of the value of the cattle should be paid, but only two thirds or three fourths of the insurance, and the Government would not lose money by it.

2867. What are your views with regard to the spread of this disorder; do you think it is likely to extend very much?—Yes, I think it is likely to extend every day.

2868. Supposing things to go on as they are going on, and nothing more is done, what is your view as to the destiny of 7,000,000 horned cattle in this country; what proportion shall we save out of them; or will any part of the country remain free from the disease?—Yes; some of the breeding districts will, just as they have of late years remained free from pleuro-pneumonia; some of the hills in Ross-shire, where the black cattle are bred, would remain free.

2869. Into those districts cattle are never imported; they are only sent out?—Yes; upon the whole we should lose many millions sterling in the country, or, in other words, several millions of cattle. I should think that if we leave the malady to propogate, within a tolerably short time we should lose a fourth of our stock.

2870. What calculation are we to make in working out the data for this system of insurance; are we to suppose that the malady is to go on as it is now going on?—No; but that measures are to be adopted, for no system of cattle insurance can live that is not based on proper preventive measures, which at the present time do not exist.

2871. You say that you would recommend a separate market for foreign stock?—Yes.

2872. Why is that?—Because it is absolutely impossible to prevent foreign traders from sending us over infected stock, and which our inspectors cannot discover to be diseased. When I travelled through Mecklenburg, Holland, and Schleswig-Holstein, and into Hanover, but especially in Holland, I found that the instant they discovered the disease they killed out the diseased animals, and sent us over the infected ones.

2873. That would apply, would it not, very much to the markets for fat cattle?—If you have animals that are not to leave the market alive you can mix them.

2874. You speak now rather of a permanent regulation, do you not?—Yes.

2875. It has been suggested that if you were to keep foreign cattle separate from home cattle it would stop foreign importation on the ground that the dealers would consider they had not sufficient competition amongst the buyers; you do not think that that would be so?—No; they should have a separate market for them, because they are so much needed now that they can very easily sell them.

2876. (*Mr. Read.*) As a matter of course, a large arable district like that of Norfolk, which requires a great number of cattle from other districts to graze in it, will never be free from this Cattle Plague unless something is done?—No; we have had that exemplified in the history of the lung disease or pleuro-pneumonia in Norfolk, in Fife in Scotland, and in Meath in Ireland; they have always had it, and they have always kept it up.

2877. Would not very heavy rains have a tendency to wash the virus out of the excreta into the earth?—Yes. I believe that water is a great purifying agent.

2878. If the virus is dried up by very hot weather, does it cease to become infectious?—Yes; it loses its power in that way very soon.

2879. (*Mr. Lowe.*) With regard to lean cattle coming down from the breeding districts, would you approve of that?—Certainly, to supply farmers with stock.

2880. You would see no risk in driving them?—There would be some, but I cannot see how it is possible to prevent it.

2881. Would you allow farmers to purchase from each other at any distance?—Yes.

2882. Or from cattle dealers who drove cattle about the country?—Yes; you could not help yourselves I think.

2883. Why do you think it necessary to kill all the animals that are affected with the disease?—Because if we keep the animals in life, and if we continue the disease over a period of time, it is impossible to prevent extensions of it in various directions, and I think we have had that beautifully illustrated by the case of Edinburgh during this outbreak. There they had been most vigorous in the way of treatment, having sanatoriums constructed, and curing the cattle in the sheds, and the result was that the disease was in a shed while two or three sheds near to it were free from it for a week or two; but as they went on treating the malady, it at last spread to the other sheds; and there is nothing like killing out the centre at once, so as to prevent contamination.

2884. You do not think that your recommendation as to doing away with the markets and fairs would of itself be sufficient?—No; you must have a control of the outbreaks, and you must publish them as they do in Mecklenburg; they give publicity to all contagious diseases; it is important that the largest amount of accurate information should be obtained as to them.

2885. The public complain very much that at the present time many of the inspectors are not qualified to decide upon a matter of so much importance?—It is perfectly easy to have additional inspectors appointed, men who are perfectly fit for the work, and to go about the country to help, and guide, and advise.

2886. Do you believe they are to be found?—Yes; of course they are. I merely state this with regard to a method of general inspection over the country, in watching the operations of the other inspectors. We certainly could find very efficient men, and a sufficient number of them; if you come to parcel out

the country into districts, plenty of qualified men for certain districts could be found.

2887. Would there not be rather a difficulty in working out such a system as you recommend ?—No ; not altogether. I think that men tolerably competent could be chosen who could be made to attend to their own special duties.

2888. Do you not think that the farmers would be rather subject to having their cattle slaughtered at the wills of these persons, and then would be prohibited for a certain time from the circulation of cattle ?—Yes ; but you cannot totally stop the circulation of stock, and I think they would have no reason to complain if we had a system of inspection combined with a proper insurance system.

2889. Why is it that you think we ought not for a month or six weeks to stop the circulation of cattle in the country other than in the large markets ?—From a commercial point of view, the amount of capital thrown immediately idle would be enormous.

2890. In what way ?—People want their money at certain periods to pay rent, and could not get it; they could not sell their cattle.

2891. I am supposing that you allow the fat cattle to be sold ?—In a large number of the farms the farmers, having nothing else to depend upon, they depend for their existence upon the sale of store animals, and they have no food with which to keep them on.

2892. Can you mention any other reason ?—I think there is really no sound objection to the movement of store cattle, except through the markets. We understand that that may, to a certain extent, have a tendency to propagate the disease, but if there is a stringent rule laid down as to the warranty of those animals, or if the sellers could be punished for selling diseased cattle, I think, as far as store stock is concerned, it is not desirable to interfere with the circulation.

2893. Supposing we have no confidence in the insurance system, or in the slaughtering system, is there anything left us besides that ?—Not to my knowledge ; certainly no system of medical treatment in sanatoriums, or that sort of thing.

2894. (*Chairman.*) You spoke just now of isolating cases of disease in districts that were infected ; has not the disease spread almost too much in England for such a system to be practically carried out ?—It is dying out of some districts, and it is appearing in certain fresh ones; but I think it is still possible to control it to a certain extent ; of course the right moment was lost ; the opportunity was lost because the disease should have been suppressed at first.

2895. (*Mr. Lowe.*) How could you isolate a district with a railway running through it ?—It is a very difficult matter to do it. In Wiltshire we succeeded; in the year 1862 stock was not allowed to leave the district or to enter it; it was during the prevalence of the small-pox epidemic ; and in three weeks the disease was suppressed.

2896. (*Mr. Read.*) You would not allow animals from an infected district to leave it, although you would permit the circulation of store stock ?—Clearly not.

2897. (*Chairman.*) Do you believe that Lincolnshire is free from the disease ?—I am not aware of the fact, but I believe it is ; so far as my information has gone it has remained free ; but we have an admirable instance of that in Ireland ; there is no doubt that there is no disease in Ireland, which proves, I think, how much can be done by preventing the propagation of the disease.

2898. What measures would you adopt with reference to Ireland; do you think it is important that the Government should issue certain regulations to meet the possibility of an outbreak occurring there ?—Clearly, and have it killed out instantly, and do as they have done in France and Belgium, kill out the centres of infection forthwith.

2899. Do you believe that a certificate or bill of health, given by an inspector, can be depended upon to prove that an animal is not infected ?—There are circumstances under which, if you had men that performed their duty properly, such a bill of health would be of value ; for instance, I have this morning inspected two bulls which are to be exported from England ; but I would not have given a clean bill of health for those animals had I not known how they had been brought from the farm on which they had been brought up here, and that both of them were put into a perfectly new van which had never been touched, and I gave a clean bill of health for them.

2900. A very efficient and large staff of inspectors would be required ?—Clearly ; and if they had been appointed when I wanted them to be appointed we should have had them now.

2901. Do you think it important to appoint in each county an inspector to inspect and superintend the other inspectors ?—I do not suppose it would be necessary to have any supervision in the counties ; in some cases there would be very little to do, and in others there would be much more to do.

2902. With regard to getting rid of the disease in the metropolis, do you think it would take some considerable time to eradicate it from the cowhouses in the metropolis ?—It would have taken no time to do it at the commencement ; but now of course it would, although they have been cleared out so much by the disease that I think it cannot last for an indefinite period of time in London ; in some places two thirds of the animals are now dead ; they have died or they have been killed. A large number of people have tried to keep them, and everybody has striven to do what they could.

2903. The sheds must be free from cattle for sometime before it would be safe for other cattle to go into them ?—Yes.

2904. (*Mr. Read.*) Do you consider that the cowhouses in the metropolis are good or bad institutions ?—I hold that no large city can do without cowhouses ; but these should certainly be put under a proper system, for they are absolutely essential, and far less detrimental, if properly conducted, than many manufactories that you have in towns. I have followed this subject up very much. I once thought that cowhouses should be abolished in towns ; but upon looking into the matter I found that the necessity, especially with regard to the infant populations of large towns, absolutely called for a proximate supply of milk ; you cannot get it from the country over a considerable part of the year at all in a fit state.

2905. (*Viscount Cranborne.*) Have you made this a subject of special investigation ?—Yes ; and I am now quite against the total abolition of town cowhouses wherever you have so large an area as that of London, for it would be attended with considerable evil. It is a very remarkable fact that the milk produced in the metropolis, however filthy the cowsheds may be, is worth to any retailer one penny a quart more than the wholesale price of the country milk.

2906. Is that on account of its superior quality ?—Yes ; it is obtained immediately after being drawn from the cow, without the cream being separated from it, and it has not undergone any shaking or churning, so that it is not deteriorated at all.

2907. (*Mr. Read.*) Do you consider that head inspectors are at all necessary in the provinces ?—I think that the Privy Council ought to have pretty active supervision over the men in the country, in order to prevent hardships to the farmers, of which the farmers have occasionally to complain ; there is no doubt of that.

2908. Would you have any head inspectors in the provinces over a certain district, in order to teach the other inspectors their duties, besides the supervision of the Privy Council ?—No. I tkink probably it would not work well. I think that if the Privy Council had several men whom they could send over the country, that would probably answer better, just in the same way in which the police are inspected.

2909. (*Chairman.*) Is there anything else to which you wish to call the attention of the Commissioners ?

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—What I would specially wish is, that immediate attention should be paid to the abolition of the horse-slaughter places, so far as the cattle are concerned, near the Metropolitan Cattle Market. Then I think that there is really scope for a little more experimental investigation upon the subject. We have been working in the north, but of course these things are very expensive, and fall heavily upon private purses, but there are many points in connexion with this subject deserving investigation. I have been asked several questions, but I feel that it is impossible to give definite answers to them without having made more experimental investigation, and there are things that really ought not to be delayed.

2910. Those experiments would necessarily, I presume, take up some time?—Yes; and that is why they should be conducted as soon as possible.

2911. But you do not think that action should be delayed till they are over?—Clearly not.

The witness withdrew.

Mr. R. Stroyan.

Mr. Robert Stroyan examined.

2912. (*Mr. Read.*) I believe you are a large farmer and cattle dealer in Norfolk?—Yes.

2913. Residing near Norwich?—Yes.

2914. In the usual course of your business, how many cattle have you probably disposed of in the course of a week?—Say about 8 or 10 score during October and November.

2915. Have you disposed of almost all of them on Norwich Hill?—Yes, on Norwich Hill, and at home on my own farm.

2916. Have you had any outbreak of the cattle plague recently on your own farm?—Yes.

2917. When did it first break out, and state how fatal it has been?—The first time that I observed it was last Wednesday morning, among a lot of 34 cattle, 24 of which all died, and now ten more are killing to-day; they are affected all but one or two. I have no doubt they will be all dead before to-morrow night. I am killing them to prevent their dying.

2918. Have you had any experience of a goat taking the plague?—Yes; about two years ago a gentleman at Norwich gave my children a goat; it was a favourite, and it ran in the yard in the winter and in the fields in the summer. My steward said to me on Saturday morning that the goat was ill, and I said, "Never mind the goat;" but yesterday morning he told me that the goat had got the plague. I then sent for Mr. Wells and Mr. Whitwell, and two surgeons, Mr. Cadge and Mr. Nichols; they came and saw this goat, and they found that it was in a very bad state of plague indeed. Mr. Wells and Mr. Whitwell said that they had never seen a more distinct case, and the poor goat was dead this morning.

2919. Are you perfectly sure that it caught the Cattle Plague from your cattle?—I am quite certain of it; it was perfectly well, and it had never been off the farm for two or three years.

2920. How did your oxen catch the Cattle Plague?—I cannot tell; my cattle had been within perhaps a quarter of a mile of Mr. Harvey's cattle at Norwich, where there has been a good deal of the plague among the cattle.

2921. How far are you from Mr. Wells's?—About 200 or 300 yards.

2922. Mr. Wells has lost a cow, has he not?—Yes; last Sunday week, I believe.

2923. Had the carcases of some of your cattle which had been affected with the Cattle Plague been passed by the inspectors and sold for human food?—Yes.

2924. In your opinion are they perfectly good?—Perfectly so; in fact, Mr. Cadge, who is a very good judge, says that he would not mind eating any one of the 23 that were dead. Eleven would not pass; they died before we could kill them; the others that were killed bled, and were passed for food, and they came to London. I sold them to a butcher, provided the inspector would pass their carcases for food.

2925. As a matter of course the closing of the store markets and fairs would be very detrimental to your own interest as a dealer?—Possibly it might be so for a little while, but I would rather put up with the inconvenience for three or four weeks than suffer for two or three years.

2926. What is your opinion as to the desirability of closing fairs and store markets?—I think that we shall not get rid of the disease without doing so. So long as the cattle are driven from one market to another we never shall get rid of it. I do not believe that the weather will have any effect upon it.

2927. In addition to stopping all store markets and fairs, would you stop the entire transit of all store stock?—No, I would not.

2928. How would you deal with it; would you allow one farmer to buy from another?—Yes; that is what I should recommend. Our farmers in Norfolk are not very willing to go far from home, if they have confidence in any of their friends to whom they can go, to buy cattle. If any friend of mine wanted a lot of cattle, and wished me to get them, I should go into Lincolnshire, and purchase them off a sound farm, with a warranty how long they had been there and sound. I think it must be done in some way of that sort. It is impossible to keep all the cattle in Lincolnshire, because at this season of the year they want to part with them, and send them into Norfolk, and we want them in Norfolk to consume our roots.

2929. What, in your opinion, would be the effect of stopping the cattle traffic now?—I think that one effect would be that they would starve the cattle in Lincolnshire, and the other effect would be that we should be starved for want of cattle in Norfolk, and our turnips would rot.

2930. You think that it is the congregation of cattle in markets that is to be prevented?—I think it is the congregation of cattle together in unprincipled men's hands; that is the evil, and we shall never get rid of it so long as the public markets go on, for A, B, and C will bring cattle to the market, and one unsound animal will pollute 500 sound ones.

2931. You see no great danger in traffic being carried on from one farm to another?—No, with careful management.

2932. What is your opinion as to fat markets?—I think you cannot stop all fat markets.

2933. Would it be any hardship to stop the fat cattle market on Norwich Hill?—Not at all.

2934. Why?—Because Norwich Hill is not much of a fat cattle market at any time; they are generally brought there to be sold to dealing men, and to come to London, and they may as well come through direct to London; the cattle all come that way, and the farmers would not suffer, nor the dealing men either.

2935. You think that the butchers in Norfolk might do as they do now generally, that is, buy direct from the farmers?—Yes, every one; you can scarcely find a Norwich butcher who does not go and buy his beasts from the farmer, and brings them home as he wants them to kill.

2936. If an order were issued that the cattle should not leave a farm, but that they should be slaughtered there, would that, in your opinion, be a very great hardship?—Yes; and it would be a great hindrance. I do not see that that is necessary, because fat cattle are different from lean cattle. I do not think that the disease affects cattle in the course of a day or two; it wants time; and they are quite fit now to get from the farmer's yard to London before they get affected.

2937. Supposing that the Metropolitan Cattle Market was kept open, you would of course have all the cattle that entered it slaughtered there?—Certainly; in the city of London. I should not allow them to leave London alive, to go into the provinces, for that would be a means of carrying the disease about as fast as it could be done.

2938. I understand you to suggest to the Commission that it would be very desirable to close all store markets and fairs, and all markets for fat cattle in the country, and to keep open none but a few large markets for fat cattle in the kingdom, and that all cattle that entered those towns or cities should not leave them again alive?—Yes, certainly; I see no other mode of getting quit of this calamity.

2939. You think that the stoppage of the transit of all stock would be a great hardship, a great national inconvenience, and a loss?—I think it would be a great detriment to all concerned, for we must have cattle into the county in the most healthy and best way that we can get them.

2940. The majority of the Norfolk farmers have not bought their store cattle now?—I think not.

2941. The season has hardly arrived, and the farmers have been very much frightened?—I think that Norwich Hill was more paralysed last Saturday than it has been yet.

2942. What was the effect that you observed last Saturday?—I observed that the spread of disease had a tremendous effect. I think that the farmers were quite paralysed, and they would not buy.

2943. How many were offered for sale?—No more than 300, or under that.

2944. What would be the general number on Norwich Hill on Saturday in the middle of October?—We have never been able to get at the number until lately, and I am not exactly certain.

2945. A couple of thousand?—2,000 or 3,000.

2946. Have you any other recommendation to make to the Commissioners?—I am not certain that I have; but I think that the Norwich Market, that I am so much connected with, is the principal store market in England, and I think we want to get that shut at once.

2947. I suppose you would not recommend that one or two markets should be shut up, but the whole of them?—It would be of no use otherwise, because one leads to the other, and they still keep the disease hanging over; to keep the cattle as isolated as much as possible is the only way that I can see.

2948. Should you think it any great drawback to the trade of the country if no cattle were allowed to pass through a certain infected district at the present time? Suppose that a line was drawn round that infected district, and an order was issued that no cattle should leave it, would that be a great hardship?—It would be a great hardship, supposing a man had two farms lying together—one infected with plague, the other sound; it would prohibit him stocking his sound land. I think that stopping the markets would have the desired effect; it would keep me, as a dealing man, and others, from exhibiting cattle at the public markets, and congregating them together so as to take the disease.

2949. (*Dr. Quain.*) The market at Croydon was prohibited the other day, and the cattle market was held in an adjoining field; how would you prevent that?—I think you would require a different clause for that. It ought to be prevented, and that would be a step in the right direction, and even if they were shown a mile or two distant from Norwich a dealer would not allow everybody to go there if he had sound cattle. I think that the disease is kept up by unprincipled men, and that they would be at once obliged to give up dealing in cattle for a time.

2950. (*Mr. Lowe.*) Suppose a man had the disease on his farm, would you allow him to take the cattle that did not appear to be infected, and drive them off in search of a buyer?—No; that is disallowed already. The rule that we have in Norwich is such, that no cattle can be taken off a farm where disease is, without the sanction of the inspector.

2951. Suppose the inspector knows nothing about it; if a farmer sees that the disease is breaking out he will be anxious to get rid of the cattle?—That is what I now wish to stop, because if the market was stopped these cattle could not be sold.

2952. Might he not sell them to somebody else; you would permit that, would you not?—No, I would not.

2953. I am supposing that it is not known that the disease is on his farm, but that he knows it or suspects it; would not your plan enable him to send those cattle off the farm, and sell them, and so propagate the disease?—I think that in a case of that sort, if there was anything wrong with the cattle, the inspector ought to be sent for; he ought to know of it.

2954. But suppose a man does not send for the inspector?—It is not a very easy matter to conceal it for more than a day or two, and another thing is, that I think no man would dare attempt to do it, because the cattle would probably die, and on the following day it would be found out.

2955. Not if the animals were in an early stage of the disease?—It appears that they incubate this disease for six or seven days. I cannot tell the period of incubation.

2956. They might be put upon a railway, and be sent a hundred miles, and then removed and sold, not in a market?—There would be very great danger of propagating the disease.

2957. (*Dr. Playfair*). You have stated that you would approve of fat cattle being sent to the markets?—Yes.

2958. Would there not be the danger of unprincipled persons driving to the markets for fat cattle animals that were in the first stages of the disease?—It is just possible that there might be a chance of unprincipled persons doing it, but at the same time these cattle going into a fat market would at once be killed and done with.

2959. Might not a herd of store cattle pass over the same roads that these diseased cattle had been driven along, going from one farm to another?—I think it is a very difficult question to deal with.

2960. Under these circumstances, if you allow the transit of cattle, might not your store cattle receive the disease?—Yes; any cattle walking over the road after diseased cattle would be likely to take the disease.

2961. Does not that make you doubt whether if you permitted the transit of cattle at all you would have much chance of stopping the disease?—It is a very doubtful question, and one that is very difficult to deal with, but I think it would be a step in the right direction if all public markets, except those of London, Liverpool, and Manchester, were done away with, and if the cattle were all killed in these various places I think you would find that you would get rid of the disease in a few months; that is my own opinion. I am perfectly certain that it is now only commencing, if the store markets are allowed to be kept open.

2962. (*Mr. Read.*) For how long would you shut them up?—I think for two or three months; not less. I would try it until the 1st January.

2963. (*Chairman.*) Are you acquainted with a case which occurred at Wells in Norfolk of the Cattle Plague?—I am not.

2964. You did not hear that it was reported that a farmer at Wells had bought near Fakenham some cattle the owner of which said that they had been on the farm for six weeks, and it was afterwards discovered that they had come from the London market?—I did not know that.

2965. You did not trace the origin of the disease in your herd?—Not at all; some of my cattle I have had since the month of May, and some of the last I bought on the 8th of August.

2966. Generally speaking, in Norfolk, whence do you believe the disease came?—I never had any doubt about it. I think it was imported from Russia.

Mr. R. Stroyan.
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2967. Not directly into Norfolk?—No; it came from London to Norwich. I have no doubt of that.

2968. Have you any evidence as to the increase of the cases of disease in Norfolk since the time of the prohibition has expired?—No evidence. I never attended a meeting until Saturday; but I found the general feeling of the meeting was that it was extending very much; I should think five or six new cases last week.

2969. (*Viscount Cranborne.*) Do you find that the change which has taken place in the temperature has diminished the rapidity of the spread and the intensity of the disease?—No; I have not seen that effect yet.

2970. (*Chairman.*) Do you believe that very great inconvenience would occur if all movements of cattle were prohibited, and the cattle were killed on the farm?—There would be very great inconvenience. I think it is almost impossible that such a thing could be done. I think it would ruin certain farmers if there were not certain cattle to come into our county to graze; and cattle of the value of 20*l.* or 21*l.* to graze would not make over 14*l.* or 15*l.* a head to kill.

2971. Is there anything else you wish to suggest?—I think you would do the best thing you could do to shut up the markets as soon as you can.

2972. (*Viscount Cranborne.*) Will the butchers suffer much if the store markets are shut up?—No. The only thing is that the cattle are bought by dealing men at Norwich, and sold to London dealing men, and these cattle might as well go direct to London. It would be a matter of no loss to any party, provided they were not shown in any public market. Let them come to any fat markets and be sold.

2973. Would you stop the importation of cattle into Harwich?—Yes; that is the first thing I would endeavour to stop.

2974. (*Mr. Read.*) Would you stop the importation of cattle into London?—No; I would stop no importation if the cattle came there to be slaughtered.

2975. You do not think that in the transit of fat cattle from the provinces to London there would be any danger of largely spreading the disease?—No; and that is the only way that you will find of getting this disease under.

The witness withdrew.

Adjourned till to-morrow at 12 o'clock.

Tuesday, 17th October 1865.

PRESENT:

Earl Spencer.	Dr. Quain.
Mr. Lowe.	Mr. Wormald.
Dr. Lyon Playfair.	Mr. Ceely.
Mr. Read.	Professor Spooner.
Dr. Bence Jones.	

EARL SPENCER in the Chair.

Mr. James Higgins examined.

Mr. J. Higgins.
17 Oct. 1865.

2976. (*Chairman.*) Will you state what position you hold at Leeds?—I am an inspector of meat, and I have also been appointed by the Mayor of Leeds an inspector of cattle under the Order in Council.

2977. Are you a veterinary surgeon?—I am not. I am a butcher by trade; I have been eight years inspector of meat.

2978. Are you still engaged in trade as a butcher? No; I devote the whole of my time to the duties of my office.

2979. Have you had any special veterinary education?—None whatever. I may say that the Mayor of Leeds has also divided the borough of Leeds into three districts, over which he has appointed three veterinary surgeons — Mr. Dray over No. 1; Mr. Cuthbert over No. 2; and Mr. Broughton over No. 3. I being an inspector of cattle have to attend to those gentlemen, and to my other duties as inspector of meat.

2980. Do you inspect live cattle as well?—I inspect live cattle as well as dead carcases.

2981. Have you power yourself to condemn an animal on account of its having the disease?—Yes.

2982. Without calling in the assistance of one of the veterinary surgeons?—Certainly.

2983. Is the Rinderpest very prevalent at this time at Leeds?—It broke out in the neighbourhood of Leeds about seven weeks since, in some pastures called Thorpe Hall pastures; they are just out of the borough of Leeds, and in the West Riding district.

2984. Do they come under your inspection?—They do not.

2985. Are you familiar with the circumstances of this outbreak?—I may state that they are pastures where stock are taken in for summer grazing; there are upwards of 100 animals generally grazing in those pastures. The first case which came to the knowledge of the authorities of Leeds was the case of a bullock, a foreign animal, which belonged to a butcher in Leeds, which had been grazing about three weeks in those pastures; it was taken ill, and the butcher went and fetched it in a cart; it came into one of our slaughter-houses in a dying state.

2986. Was it through this bullock that the remainder of the animals on this pasture were infected?—It was through this bullock that the authorities in Leeds and the West Riding magistrates appointed inspectors. When I saw the bullock I thought that it was a very peculiar disease, such as I had never seen before, and I called the attention of Mr. Dray, a veterinary surgeon, to it, and upon examination he was of opinion that it was a decided case of Cattle Plague.

2987. Can you tell the Commission how in your opinion the Rinderpest came to this herd; what was the origin of it?—I believe that this bullock was the origin of the Cattle Plague in those pastures.

2988. Had he been recently in any public market in contact with diseased animals?—He had been brought over with a lot of foreign animals from Hull, and was sold in the Leeds cattle market about three weeks previous.

2989. Did he show signs of illness before he fell ill in the manner which you have described?—No; he only showed signs of illness about three or four days before he was slaughtered.

2990. Then is it your opinion that he had the disease in him when he arrived from Hull?—I believe that that animal introduced the disease into those pastures.

2991. To whom do these pastures belong?—I think

that they are the property of Mr. Ingram of Temple-newsam.

2992. (*Mr. Ceely.*) That bullock came with some other animals?—There were two others with him; they were three foreign bullocks.

2993. (*Chairman.*) How many animals are pastured on this Thorpe Hall pasture?—More than 100.

2994. And did many other animals fall sick of the Rinderpest?—About some 50 have since died from the Cattle Plague in those pastures.

2995. Is there anything peculiar with regard to these meadows, such as drainage?—There is.

2996. Will you state what that is?—The pastures lie on the River Aire; they run a long way on the River Aire. The river at that point receives the whole of the sewerage of Leeds.

2997. (*Mr. Read.*) Just before it waters these meadows?—Just before it runs along these meadows.

2998. (*Chairman.*) Are the animals able to drink this water?—Yes; they have access to the river at all times.

2999. Had there been no diseased animal slaughtered in Leeds prior to this outbreak at Thorpe Hall pastures?—Not diseased with the Cattle Plague, that I am aware of.

3000. I suppose that the drainage from the slaughter-houses would fall into the river?—The whole of the drainage of the drainage district of Leeds goes into the river at that point. I think that I shall not be wrong if I venture to state that there is plenty of water to drink. In my own opinion the river is in such a state that no animal will drink the water.

3001. You do not think that polluted water was the cause of the animal falling sick of the disease?—I do not, for this reason; these pastures lie low, and at certain times of the year they are very liable to produce disease. I will say that there is disease at certain seasons of the year, I believe, in those pastures; but more particularly a disease which we butchers call the milt complaint, or splenic apoplexy.

3002. Has the disease spread much in Leeds?—Up to last Saturday we had only had ten cases of Cattle Plague in animals brought into the borough, eight of which were cattle which had been imported into Leeds out of these pastures; they were brought by the owners to the slaughter-houses.

3003. Has the Mayor of Leeds taken any steps with regard to the stoppage of the markets and the fairs?—He has not.

3004. Has that point at all come under your consideration?—I think that it has not at present.

3005. Have you formed any opinion yourself as to the desirability of stopping the fairs and markets?—Do you mean both the fat-cattle fair and the dairy-cow market?

3006. All fairs of live stock.—I think that it would be desirable that the dairy-cow market should not be held at all at the present time.

3007. Is there a large dairy market in Leeds?—Yes; pretty large. It is held on the Tuesday, and the fat-cattle fair is held in the same place on the Wednesday, the day following.

3008. Is there any market at Leeds for store beasts?—At the Tuesday market both dairy cows and store beasts are shown.

3009. Would you stop the store market as well as the dairy market?—On the first introduction of the disease into these Thorpe Hall pastures, I recommended, in a letter which I wrote to the chairman of the market committee, the removal of the dairy-cow market into a field which is the property of the corporation. However, that has not been done. The markets committee are taking steps to divide the market, and have a separate portion of the market set apart for the showing of foreign cattle; they are now erecting pens for that purpose.

3010. You would be opposed to the shutting-up of the fat market?—Ours is a very large market, and I do not know how our butchers would get their supplies of cattle; it is almost a West Riding market. I am afraid that we should have 20 or 30 markets, as it were; the cattle dealers would bring cattle for sale into the slaughter-houses, and I think that it might be attended with more danger than allowing the butchers and the cattle dealers to meet in the cattle market; for this reason, I think that if the fat cattle were exposed for sale in the open market they could be subject to a better examination than if they were spread into 20 or 30 slaughter-houses. In a great many cases they might be brought into those slaughter-houses, and never be inspected at all.

3011. Some of the witnesses before us have suggested that all movement of cattle should be stopped, and that the cattle should be slaughtered on the farms where they are grazed. Do you think that that would be practicable?—With regard to the borough of Leeds, more than half of our supplies of fat cattle are foreign animals, arriving from the port of Hull, and from Hartlepool, and Newcastle.

3012. But if arrangements were made at Hull, and Hartlepool, and Newcastle, for slaughtering foreign cattle as they arrived, would it not be practicable?—They would be of no use whatever to the trade of Leeds. Supposing that they were slaughtered in a very eligible and a very convenient slaughter-house, my experience as a butcher is, that if the carcases were sent to Leeds, they would be to a great extent so much deteriorated, and especially if we had what we call soft muggy weather, that in many cases the carcases would lose their value to a considerable extent.

3013. Would the same remark apply to the home trade?—I think so. I think that if slaughtering took place upon farm premises, the farmers generally not having proper accommodation to slaughter their cattle, they would be slaughtered and sent to market in a state which would be of no possible use to the farmer or to the butcher.

3014. Do you not get any supply of dead meat from Scotland?—No; we send out of Leeds a very large quantity of dead meat to London.

3015. Why could not other towns send dead meat to Leeds?—They are sheep and lambs; no beef is sent, because it cannot be sent up in a proper marketable condition which will make it profitable to the owners.

3016. Does not a good deal of Scotch beef come to London dead?—I believe so.

3017. In what state are the slaughter-houses in Leeds?—The slaughter-houses in the borough of Leeds are all registered. We have about 150. We have six very large slaughter-houses capable of slaughtering from 200 to 300 head of cattle, besides small goods.

3018. From 200 to 300 in a day?—Yes; we almost look upon them as public slaughter-houses, though they belong to private individuals.

3019. Are those slaughter-houses adjoining the cattle market?—No; they are in the centre of the town, just beside the butchers' market.

3020. Do you consider that they are in a satisfactory state?—Yes; they are regularly visited once a week; they are all kept in a cleanly state.

3021. Have you had many diseased animals seized in the market?—Do you mean the live market or the dead market?

3022. The live market?—We have not seized any in the live market as yet. When I mentioned about the outbreak of Cattle Plague in Thorpe Hall pastures, just out of the borough, I was going to say that last week we got information that the Cattle Plague had broken out at Moretown, about four miles north of Leeds, in one of the most healthy districts of the borough of Leeds.

3023. Was that traced to the market of Leeds?—I have not been able to trace it satisfactorily. These are dairy cows. The disease is on some six premises, and the owners told me on Sunday that they blamed 12 Irish beasts which had been taken out of Leeds market three weeks last Wednesday, and had been put into a field at Moretown, near to the farmer's stock who had been the severest loser by the Cattle

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Plague. Whether rightly or wrongly, he blames these 12 Irish cows. I may state that when I was inspecting in the cattle market three weeks last Wednesday, I saw these 12 beasts; and I had information (I have not been able to ascertain whether my information was correct) that these animals had been brought from the neighbourhood of Wakefield, and that they had been herded with some infected stock. I thought it my duty to have these animals set apart, and they were taken and put into one of the cattle-sheds, and I called in the three veterinary inspectors for Leeds to examine them. They examined every one of the animals, and they passed them as being free from the disease; they were taken to Moretown. I may state that a person of the name of "Wells," who lives just out of the borough, has lost six animals last week, and a person of the name of "Marston" has lost three, and the fog fields, where the animals were, are between the two farms; they are not above 150 to 200 yards distant from one another.

3024. (*Mr. Read.*) By "fog" field you mean grass field?—Yes.

3025. (*Chairman.*) You have stated some cases which appear to have carried the Cattle Plague from Leeds market; how would you prevent such a thing happening again?—I do not know how it could be prevented.

3026. It has been suggested that cattle should only be sent to market for the purposes of slaughter, and should not leave the town alive; would that be practicable at Leeds?—I do not believe that it would be practicable.

3027. At the present time cattle are bought by a butcher, and they leave Leeds alive, and are kept by that butcher until he requires them at his own place?—That is as regards the cattle dealers; but Leeds is bounded on three sides by an agricultural district, and the farmers themselves bring cattle to sell. I think that it would be impracticable for the farmers to bring them to the slaughter-houses, and then sell them to the butchers after they are slaughtered.

3028. I did not mean that they should go straight to the slaughter-houses, but should go and be sold at the market as now, but that instead of being taken away alive to different parts of the country they should be slaughtered in Leeds, because the disease is very often spread by animals coming to an infected market and taking the disease away to other districts?—I understand the question perfectly. Last Wednesday a number of cattle were turned out unsold from our cattle market. I am afraid that they will take and spread the disease elsewhere. It would be very desirable, if it could be done, not to allow any cattle which have once been exhibited for sale in any cattle market to return to their homes, but to compel the sale of them. We have a case exactly in point. Last Wednesday my attention was called to a beast by the owner, which was up at Woodhouse. I took a veterinary surgeon with me, and at once we found that the animal was labouring under Cattle Plague. It was the only animal which the person had, and unfortunately that animal had been exposed for sale in the Leeds cattle market 14 days previously, and had been turned out into a field; it became ill on the Sunday and died on the Thursday, or rather it was killed. If that man had been prevented from taking his cattle out of the market, and putting them into a pasture, no doubt the animal would not have taken the disease, and the man would not have suffered the loss of his animal.

3029. Then you believe that it would be practicable to prevent animals once sent to the Leeds market leaving it again alive?—Yes; I think it not only practicable, but desirable.

3030. (*Mr. Lowe.*) You would keep markets for fat stock still, as I understand?—Yes.

3031. You would of course allow cattle to be driven and sent to those markets?—Of course.

3032. Supposing that a man wanted to move his cattle from one place to another, and not really to send them to the market, but were to say that he was moving them with the intent of sending them to the market, how could you prevent that?—I do not know how it could be prevented.

3033. Does not that permission give a facility for moving cattle all over the country, under the pretence of sending them to the market?—Certainly it would do so. On the same principle, if they were sent from a farm direct to a slaughter-house.

3034. They might make a pretence of that; they wanting to do something else?—Yes.

3035. And that would apply to every permission to remove animals?—It would.

3036. Is beef worse to carry than mutton; is it more deteriorated by the railway journey?—Yes; considerably.

3037. From what does it suffer?—It is very difficult to pack. If you take a carcase of mutton, taking these London hampers, which are provided by the railway companies, for the sheep or lambs, you can put from 10 to 15 sheep or lambs into those hampers, and they will generally arrive in London not much worse, if any; but it is a different thing to pack four quarters of beef, which may weigh from 10 to 15 stone a quarter, into a hamper; there is a difficulty in it; they are bad to lift, and when I am at the railway station I see that they are knocked about, and they have not the means of lifting them on to the vans, and they are tumbled off the van into the street when they arrive at their destination, and very often they are very much deteriorated.

3038. Then the difference is principally on account of their greater mass and weight?—Yes.

3039. It is not from anything in the quality of the meat, but from their being so much larger, and more unwieldy, and therefore being more knocked about?—Yes; and if you pack four quarters of beef, you cannot pack them and send them in the same condition as a hamper of sheep or lambs.

3040. From their greater size?—Yes; from their unwieldy bulk. It has been tried many times by our butchers to send up carcases of beef, but it never pays them; they always lost money by it.

3041. (*Dr. Playfair.*) If it is true, as it has been given us in evidence, that beef arrives in good and sound condition from Scotland, to the London market, is there any reason to apprehend that beef would arrive from Hull to Leeds in worse condition?—I cannot conceive that in summer time it can arrive in good condition out of Scotland, in hot weather, or in what we call soft and muggy weather.

3042. Taking from now till the end of January, would there be any difficulty in getting the slaughtered foreign beasts arriving at Hull as dead meat to Leeds?—It would depend to a considerable extent upon the manner in which the railway company packed them. I think that they might come, in what we call sides of beef, in proper carriages, without being much deteriorated. I was speaking of sending them up in four quarters, and packed in one of the London hampers; putting four quarters of beef in a hamper. I think that if it was thought desirable to slaughter the animals at Hull, which are intended for Leeds and the West Riding market, if they were sent in whole sides, they might not be very much deteriorated in value.

3043. (*Mr. Lowe.*) That means half the animal?—Yes; the animal just cut in two.

3044. (*Mr. Read.*) How would you send these sides?—They could be packed better than quarters, if they were properly managed.

3045. But not in hampers?—No, not in hampers; there ought to be a proper vehicle for sending them in.

3046. (*Dr. Playfair.*) You have said that the animal which introduced the plague into the Thorpe Hall meadows had been bought three weeks before at the market of Leeds?—Yes.

3047. Is it not the prevailing opinion at Leeds that these cattle acquired the disease by drinking the sewer water?—I believe that some people hold that opinion.

3048. Have you seen many instances of the plague yourself?—Since its introduction into the borough of

Leeds I have seen about a dozen cases, until last week. I have seen some eight or nine cases last week in the borough of Leeds.

3049. Have you ever heard in your neighbourhood of one animal giving the disease to another at such a distance as three weeks ?—No.

3050. There is, however, no means of accounting for it, in your opinion, except by that animal ?—No. We had a third case, which was a foreign bullock, which had been bought in Wakefield Market by a Leeds butcher along with some others ; I think there were four of them.

3051. Was that also three weeks before ?—No ; it was bought in Wakefield Market on the Wednesday, and it was kept in a field in the borough of Leeds, at Osmondthorpe, for eight days. It was then brought into a slaughter-house to be slaughtered, and I detected it as having the Cattle Plague. I think that that perhaps was the most acute case which we have had. It was a foreign animal.

3052. (*Mr. Ceely.*) Where had that animal been purchased ?—It was purchased in Wakefield on one Wednesday, and it was discovered by me in a slaughter-house in Leeds on the Wednesday following ; that is eight days. It was turned out in a pasture.

3053. When purchased it appeared to be sound ?—Quite sound. It was a good Spanish bullock, and worth a good deal of money.

3054. How long did it live ?—I thought that it would not have lived the night out. I called our veterinary inspectors to see it the next morning and we were very desirous that the disease should take its course, but the owner would have it killed, as he said, out of its misery.

3055. It was killed ; it did not die ?—Just so.

3056. In what state was the carcase ?—In that case the animal was not bled ; it was only knocked on the head.

3057. The flesh looked very dark ?—It of course had the blood in it.

3058. But you have no doubt about that being the disease ?—There is no doubt about it.

3059. What was done with that animal ?—It was buried. I may state that the mayor of Leeds has agreed with a person to fetch and bury, according to the direction of the Orders in Council, every diseased animal which may die or have been slaughtered on account of this disease ; they are all taken to one place ; they are buried, and covered with quicklime, and covered with five feet of earth.

3060. It is known that they are buried properly ?—There is a man appointed on purpose to go and see the animal buried. I may state with regard to this Cattle Plague, that I have seen many thousands of diseased animals. Perhaps you may be astonished to know that in the course of my duties as meat inspector I have examined 1414 carcases which were brought into the borough of Leeds known or supposed to be in a diseased state.

3061. (*Mr. Read.*) In how many years ?—For one year. That is during the year 1864. That requires an explanation. After I was appointed inspector, the authorities of the borough of Leeds were very anxious to deal with the question of diseased meat. For about two years diseased animals were liable to be seized if they were brought into the borough of Leeds by any person, and were not fit for human food, the matter being brought before the Sanitary Committee of the Town Council. After very long and serious consideration of the subject, and after conferring with a number of the principal butchers, it was thought desirable to allow farmers and butchers, and owners of stock, to bring into any of the slaughter-houses of the borough of Leeds any animal which was known or supposed to be in a diseased state. A byelaw was introduced into the slaughter-house bye-laws, wherein it is stated that every owner or person bringing into any slaughter-house of the borough of Leeds any animal known or supposed to be diseased shall forthwith give information thereof to the officer of the Council, that is to me, as meat inspector. It is then my duty to examine that carcase as to its fitness or unfitness for human food, and I may state that in 1863 I condemned 598 carcases of diseased animals as unfit for human food, and in 1864 I condemned 547 of such diseased carcases.

3062. Sheep or bullocks ?—Beasts, calves, sheep, and pigs.

3063. (*Mr. Ceely.*) In any of those cases was there anything approaching to the disease of which we are now speaking ?—I never saw a disease in my life at all like the disease known as Cattle Plague. I think that any practical experienced person, a butcher, for instance, if he sees one such animal in a very diseased state, will never forget it as long as he lives. He cannot make a mistake, if he is honest, with regard to Rinderpest.

3064. (*Mr. Read.*) Do you mean when the bullock is alive, or when he is dead ?—Both.

3065. Whether a man saw the carcase or saw the live animal he would never mistake it ?—If the mouth is examined there can be no mistake.

3066. (*Chairman.*) Supposing that you were walking down the market, would you be able to detect, at a butcher's stall, meat which was diseased with the Rinderpest ?—It would entirely depend upon the stage of disease in which it had been slaughtered. I may state that in the second case of Cattle Plague which we had, the animal had been under examination for two days. It was brought out of the Thorpe Hall pasture on the Friday morning by the owner, and our veterinary inspectors had it set apart in a stall belonging to the owner. It was slaughtered on Saturday evening. Although the animal showed unmistakeable signs of Cattle Plague alive, such as running at the eyes and running at the nose, when it was slaughtered there was positively no sign of disease whatever on the carcase as it hung up in the slaughter-house. I was perfectly astonished at it, and I frankly stated to our veterinary surgeons that had I had that case I should most undoubtedly have passed that carcase as a sound carcase of beef, and fit for human food.

3067. (*Mr. Read.*) Did you pass it ?—No ; it was condemned.

3068. Why ?—The veterinary inspectors came down on the Sunday morning to make a post mortem examination of this animal. Of course professional men have their own way of examining beasts, and butchers have theirs. As a butcher I looked at the carcase of beef. I then looked at the heart, the kidneys, the lungs, and the liver ; they all appeared to be perfectly sound and healthy. Of course the veterinary inspectors went through the entire intestinal canal and the stomachs, and they found in their investigation that this was decidedly diseased ; they showed that the fourth stomach was very much ulcerated.

3069. And therefore they condemned the meat ?—Yes.

3070. But in your opinion the four quarters of meat were perfectly good and fit for human food ?—I would not say so.

3071. But you would have passed it ?—I should have passed it. I was under the impression that we had been mistaken, and that it really was not the disease of Rinderpest.

3072. (*Mr. Ceely.*) Then you consider that at a certain stage you would not be able to detect any alteration of the meat ?—If the animal was killed at a very early stage, I should not be able to detect any alteration in the carcase. There is only one thing ; the blood of the animal sticks peculiarly to your hand, showing that it is a blood disease.

3073. And it is dark coloured ?—Yes.

3074. Do you mean to say that when the animal is alive, or after death, you would detect a difference in the mouth under the Rinderpest and in the mouth of an animal under the foot and mouth disease ?—Yes.

3075. That is to say, living ?—Yes, certainly living. We have had a number of Scotch bullocks in two places in the borough of Leeds, and our attention was

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called to them. There were 13 in one lot, and two in another, and when the mouths of those animals were opened I at once recognized it as foot and mouth disease. I say that because it is so peculiar; the tongue is blistered; on the top of the tongue there are large blisters; it is not so with Rinderpest. We have blisters upon the tongue in foot and mouth disease, but in Rinderpest we have all the top of the mouth affected with red. I do not know that I should be right in calling it ulceration of the mouth; all the lining of the lips and right away down to the trachea, to the throttle, it is affected with red patches, and upon those patches there is a kind of white scurfy matter.

3076. (*Mr. Read.*) You send a good many lambs dead to London?—We do.

3077. Which is the most perishable and the most delicate meat, lamb or beef?—Lamb.

3078. Leeds is a large fat-stock market?—It is.

3079. Is it larger than Wakefield?—They are about equally divided.

3080. How many cattle and sheep have you on an average upon a market day?—We average about 600 head of fat cattle, and from 3,000 to 4,000 sheep and lambs.

3081. How far is Leeds from Wakefield?—Nine miles by the road.

3082. You say that in certain seasons of the year the splenic apoplexy is prevalent on the meadows near Leeds?—Yes.

3083. At what time of the year would that be?—Generally at the back end of the year.

3084. Not in June or July?—No; generally in October.

3085. You are of opinion that there is plenty of water for the stock to drink on those meadows without drinking the filthy sewage in the river?—I think there is, and that the cattle will not drink the other. I will not speak positively upon that point.

3086. It is your opinion that the Dutch cattle imported the disease into that district, and that it did not break out in those meadows spontaneously?—I think not.

3087. (*Chairman.*) Is the market-place at Leeds properly disinfected?—It has not been disinfected at all.

3088. Is there a great deal of Rinderpest prevalent in Yorkshire?—No, not so much. I may state that this outbreak that we had at Moor Town in the borough of Leeds is of a very aggravated character.

3089. Is there anything to which you wish particularly to call the attention of the Commissioners?—I was going to mention, as there are a variety of opinions entertained as to the desirability of curing animals affected by this disease, that I can relate a fact,—a fact that will always present itself, I think, to the minds of all owners of cattle. Last Saturday, along with Mr. Dray, a veterinary inspector, I went to visit some animals belonging to a person of the name of Marston at Moor Town; he had 11 dairy cows in good and fair condition, that were worth about 17*l.* a piece. On Sunday morning we went again, and one of them was dead; it had died early that morning, and the other was nearly dead; it was destroyed, and taken away and buried. I ought before to have said Saturday. On Sunday morning we went again, and we found that there were nine cows, and we found another one diseased, which we set apart from the rest of the animals. The man was very anxious to dispose of his other stock. He said it was all the property he had in the world, and he went down to Leeds to fetch up a butcher, and the butcher bid him 100*l.* for the remaining eight beasts. He asked leave to have them slaughtered on the premises, and if they were found to be free from disease the butcher would pay for them; and of course leave was given him. I think that such facts as these will always have their effect in preventing any curative measures being adopted with regard to any animals, whether they be dairy cows or whether they be fat stock.

3090. Are you in favour of trying curative measures or not?—I think that the farmers would not consider it their interest to do so. I think that they will look upon it as a question of pounds, shillings, and pence.

3091. (*Mr. Lowe.*) It is not a pounds, shillings, and pence question?—I think it is.

3092. (*Chairman.*) You do not think that you can rely upon any proposed method of cure with the view of eradicating the disease out of England?—Of course I am not a member of the veterinary profession, and I cannot say.

The witness withdrew.

PROFESSOR DICK and Mr. JOHN SWAN examined.

Professor Dick and Mr. J. Swan.

3093. (*Chairman.*) (*To Professor Dick.*) I believe you are principal of the Veterinary College in Edinburgh?—Yes.

3094. (*To Mr. Swan.*) Will you state what your position in life is?—I am a partner in the firm of Swan and Sons, Live Stock Agents in Edinburgh and Glasgow.

3095. (*To Professor Dick.*) Have you studied the spread of the Rinderpest in Great Britain and especially in Edinburgh?—Yes.

3096. Will you state how you believe the disease arose in Edinburgh?—At first it seemed to arise in consequence of a herd of cattle being brought down from London.

3097. Will you be so good as to state the particulars of that case?—The two cases that I first saw belonged to a cow feeder of the name of Ogg. These animals he had bought from a man of the name of Shaw, a dealer, out of the drove of cattle that were brought down from London; several other cow feeders bought cattle out of the same drove; and the disease broke out almost simultaneously, or within a few days after those which occurred in Ogg's byres. I understood that there was one Scott that had it the day before, but I did not see that one, so that the first I saw was Ogg's.

3098. What was the date of that occurrence?—I think it was about the 8th of August. I have not a jotting of the date, but they were brought down in July; and I think it was about the 8th of August when they began to show appearances of the disease. The disease spread through this person's byres, and all the other cows died; but those two that came from London, the foreign beasts, recovered. The disease extended to other byres in the same lane, a narrow lane, on the one side in particular. On the other side there was a Mrs. Spence, who had a byre with a number of cows in it; and for several weeks those cows were unaffected, although they were within a little more than about the length of this room, or a little more off, with open windows; still it did not proceed to attack them for a considerable time.

3099. Has the disease spread with rapidity in Scotland?—It has spread in some parts from byre to byre with considerable rapidity. There were particular spots where it seemed to rage with more violence than in other parts; for instance, one is a place called Silver Mills near Stockbridge, and there are a number of byres there. Most of the cattle have died; but there has been one or two recoveries; and in one byre only a short distance from that place, there were four recoveries out of six. The disease also extended in the direction of the mill lead, which is very noxious and fœtid, and runs close by all those byres. At Canonmills there were two or three byres affected in the same way; and a little further on there were three byres which were also affected.

3100. Is it your opinion that the disease was communicated from London—Yes. There s no other appa-

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rent cause for it. No doubt the weather was favourable for the propagation of the disease, and the obnoxious vapours arising from this burn. I think that in all the places in Edinburgh where the disease occurred it was generally in situations that were rather naturally unhealthy. There is another place very similar to Silver Mills, and the mill-lead, at a place called Roseburn, about a mile and a half out of Edinburgh, where a foul burn passes along the front of a number of new houses that were built there for cow-feeders, and nearly every byre has been affected on that line. There is a great stench from this burn, into which the drainage of the town, the slaughter-houses, and so on, is carried, so that the air there is rather unhealthy; the byres are not much raised above the level of the burn, and consequently they are much exposed.

3101. In those byres the disorder did not break out in consequence of direct contact with the diseased animals, but from the effluvia that arose from those drains?—So far as I know there was none in particular; but the interchange was such that it was difficult to say whether there had been any cows brought into those byres or not. I believe that some of them had been cows brought from London, for it went on from byre to byre, until the whole line of byres was nearly swept. The returns that were sent up will show the numbers and the proximity of the different byres to one another.

3102. But the matter from the cows that were diseased and slaughtered in the slaughter-houses, or from the byres in which they had been kept, might have been in those drains, and thus have communicated the disease?—Yes.

3103. Will you state what steps were taken at Edinburgh when the disease first showed itself?—The best plan, I think, is at once to separate the sound from the unsound, and to take them to a different locality.

3104. My question was What measures were taken by the provost and authorities of Edinburgh with a view to stop the disease?—The only measures that have been taken are the formation of the sanitarium, so that the diseased animals could be removed to it; and strict regulations have been laid down in order to prevent animals being taken through the streets from one place to another, and to avoid bringing them into contact with the healthy animals.

3105. Is Edinburgh subject to the same Orders in Council which are applied to England?—Yes. A good many of the healthy animals when they were seized were generally removed, if it was at all possible, or the diseased ones were removed into separate byres, and when it could be done we were in the habit of treating those that were kept on, and which at all gave any prospect of recovery.

3106. Were inspectors appointed as they are in London and in the country?—Yes.

3107. Did they work efficiently?—I was appointed one of the inspectors, and three of my assistants also; there were besides two of the meat inspectors of the markets that were appointed, so as to assist, and to report to me when any case occurred, when I either went myself or sent one of my assistants to see it.

3108. Were you able to put a stop to the nuisances you have spoken of arising from those bad drains and places where there were stenches?—There is at present an extensive and expensive work going on in order to drain the water away; they are carrying it down to the sea, at a very considerable expense, but it will not be done for a considerable time, and that is the only way in which it can be done.

3109. Were these byres shut up?—A great many of them are empty; the animals have been killed out, or have died out.

3110. Have the markets and fairs been stopped at Edinburgh?—They have a market every Wednesday.

3111. You are probably aware that under the recent Order in Council the provost of Edinburgh has power to stop for a certain time the holding of all fairs and markets in the town; has that been done?—Mr. Swan will be better able to speak to that.

(*Mr. Swan.*) So far as the markets for store cattle are concerned, I believe they have been stopped; Dalkeith has been stopped, and East Linton, and also Hallow fair.

3112. Has it been confined to markets for lean cattle?—Yes; to lean cattle alone.

3113. (*To Professor Dick.*) You are one of the gentlemen who were appointed in Edinburgh to report to the lord provost and the magistrates on the Cattle Plague?—Yes.

3114. You made some recommendations, I believe, with a view to stopping the disorder; will you be good enough to state what they were?—The great object was to establish a sanitarium, so that the animals could be placad there, and be separated from the others as soon as possible, and put under treatment, or, where a separate place could be got from them, to have them placed separately from the other cattle.

3115. Do you consider that sufficient to stop the disease?—I consider that if they were at a sufficient distance, or at a reasonable distance, it would be; but I may mention a curious circumstance which occurred in the neighbourhood of the sanitarium to which the cattle are all taken, past a small paddock. A cow has been going in that paddock for the last two months, and has continued in perfect health, while the byre with 13 cows on the other side of the road, close by the road side, has also escaped. It would appear that it does not extend a very great distance from the animals that are affected going along the road, from those two cases, which are very well marked.

3116. Do you consider that the establishment of sanitaria in different parts of the country would be sufficient to get rid of the disorder in the country?—Yes, I think so. I may mention that we were not successful as to the treatment in the sanitarium, but it was useful in enabling us to get the diseased cattle away from the sound ones. We could not obtain accommodation enough to enable us to send the sound ones all away to separate places, which I should have preferred, because the air would have been changed, and they would have been got away from the foul effluvia which I mentioned as arising in the neighbourhood of the various byres where the disease prevailed to such an extent.

3117. In the 9th section of paper No. 14. of the report, which I hold in my hand, I find this passage: "If these views be correct, then it is obvious that "not only is the isolation of the healthy from infected "cattle imperatively demanded, but that there is "great risk, under present circumstances, in bringing "together droves of cattle, as at fairs and markets, "seeing that amongst them may be included infected "animals capable of communicating infection, even "though they may exhibit no outward symptoms of "the disease detectable by the most experienced "veterinarians."—Yes; there is no doubt that for a certain time they are not quite safe, and it would be well to have the markets dispensed with as far as possible. In the meantime I may mention that we are testing the infectiousness of the disease in sheep.

3118. Do you believe that there is considerable danger, when large droves of cattle are congregated together in fairs, of spreading the disorder through the country?—Yes.

3119. The 10th section goes on to say, "It would "appear to the committee to be a legitimate practical "induction from these premises that fairs and markets "for the sale of lean or store cattle should be for the "present suspended. The greatest caution should "also be exercised in regard to the traffic in fat "cattle. If markets for fat cattle could be avoided, "and some other arrangement could be made by "which the butchers could supply themselves, that "course would be highly desirable; but if such "markets be unavoidable, then it would be desirable, "as suggested by Mr. Swan, the eminent cattle sales-"man, that they should be held more frequently than

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" at present ; say, twice a week instead of once a " week, so that lots of cattle purchased by the " butchers might be at once slaughtered without any " delay, instead of its being necessary to keep some " of them for several days before being slaughtered, " at some risk of spreading the infection." What is your view with regard to fat cattle ?—The plan that I generally adopted where fat cattle had any chance of coming into contact with diseased cattle was to recommend that they should be slaughtered as soon as they could be disposed of, and if they were in perfect health that the cattle should not be taken to the market, but that a butcher should be requested to come to the byres, and look at them, and buy them privately from the cowfeeders.

3120. On the farm of the feeder ?—Yes ; so that there could be no danger of their being travelled, and coming in contact with bad ones, but be taken away to be slaughtered by the butcher.

3121. There is danger, is there not, if an animal is sent to the market for slaughter, of its being sent back again infected to graze in other districts ?—Yes.

3122. Do you think it is practicable for the cattle to be slaughtered on the farms where they are reared, and be sent to market as dead meat only ?—If they could be slaughtered on the place where they were reared, and sent to market, no harm would arise from that ; none whatever.

3123. (*To Mr. Swan.*) Will you be good enough first of all to express your opinion as to stopping the lean cattle markets ?—At the very first, when the disease came to this country, we were getting a good deal of stock from Holland, and it came out that there was a certain number of Dutch cattle that were got in London, and sent down to a farm in Tweedside ; they were bought on a Monday out of the stance where dairy cows had been standing. I have made an investigation into the matter from the commencement, and yesterday the man who sent them down showed me where he had bought them in the Metropolitan Market. These 14 cattle were sent down on a Monday to Berwick amongst some Dutch heifers. They lay in a field at Berwick several days among some short-horned bullocks, and on the 18th of July the Dutch cattle were offered for sale at St. Boswell's fair. They were unsold, and were sent to Kelso, and on the Friday following they were sold to Mr. Henderson at Shedlaw ; and Mr. Oliver of the Spread Eagle Inn got part of the heifers. The heifers were all quite sound up to this time ; but immediately after, that is the day following, the bullocks were attacked by the disease, and they were nearly all killed out. That showed that the disease had come there, and it was the first that had come ; immediately after that it appeared in Edinburgh. I was told in Edinburgh market that there were so many cows, 12, had died ; I left the market immediately, and went over to Professor Dick, and I found him and Professor Strangeways, and I said to them, " If there are 12 " cows dead in Edinburgh I shall go to London " to-night, to see the Home Secretary upon the " matter." I accompanied Professors Dick and Strangeways to Silver Mills to some byres there, and we saw two cows affected ; the first that the professor had seen, but he did not give his opinion. From there we went to Ogg's byre, and found a Dutch cow there which had then all the symptoms that Professor Simonds gave out as the indications of the disease along the back, and looking the same as if it was blown out with wind. Professor Dick then, I believe, came to the conclusion that it was Rinderpest. We called a meeting immediately on that day at the Corn Exchange, and since that time we have formed an association, and have a meeting every Wednesday. We have these meetings with a view of trying to suppress this disease. I have attended at every meeting, and I have endeavoured to point out the necessity of allaying the public alarm. Sir William Bruce, the convener of the Falkirk Tryst Committee, instructed his agent, Mr. Strong, to ask me to come out to speak with him, and when I came out I told him that we would take no cattle there without having certificates that they had come from the breeders. There were five or six score of diseased cattle had been shown in Edinburgh, and wherever they went they were likely to spread the disease ; if they got into a market they would do so ; if those cattle got into Falkirk market they would carry the disease. Eighteen of them got in, and we found out shortly after that the disease broke out in Forfarshire. A man of the name of Fawns had bought upwards of 190, and among those were those 18 beasts that had been shown in Edinburgh market.

3124. At that time, I believe, you advocated a suppression of fairs and markets ?—Yes. When it was intimated that this disease came from Holland, our firm wrote to say that we would not on any account receive cattle from that country. We wrote to Mr. Baring, stating to him what we had done, and also saying that we should be glad to come to London to give our opinion as to the best method of preventing the spread of the disease, and in order to put a stop at once to all public alarm. I was not altogether satisfied with the inspection that was carried on in Scotland, nor am I just now. We have found out that the veterinary surgeons throughout Scotland know little about the disease. Going from place to place, we are afraid that they are carrying this very noxious infection with them ; and I recommended the Home Secretary to appoint the sheriff or the convener of the county, or both of them, to call a meeting of the leading stockholders of the county, who should report each day as to the health of the cattle in their respective districts. By doing that I think, myself, that the disease would be far better kept down than by veterinary surgeons who have nothing to prescribe ; and without we can get a prescription there is nothing to be done. If this was done I think good would result from it. Let them receive their advice from Professor Dick, in Scotland, and from Professor Simonds, in England, and let the farmers associated have the whole power over the stock ; and I am sure there would be great interest taken, and every effort made to get the disease kept under ; but the system now is, that a poor man has his stock slaughtered without appeal.

3125. You have stated your views as to the markets for lean and store cattle. What do you say as to the markets for fat cattle ? Do you believe that they also tend to spread the disease ?—I am afraid that it would be neither practicable nor workable to stop the fat cattle markets. I suggested six weeks ago in Edinburgh and Glasgow, that they should order a brand to be put upon every beast in the fat stock market, in order to show that it had been there ; and I recommended them on no account to let any beast go into the fields for fear it should come in contact with the grazing stock. I may say that in Edinburgh the substitution of a slaughter market for a live fat cattle market is unworkable.

3126. Do you believe that fat cattle markets tend to spread the disease ?—Yes ; if they went into a field, and came into contact with animals grazing ; distinctly so.

3127. You have stated your reasons why you think that the fat stock markets could not be abolished ?—Yes. Just now there are cattle coming from Denmark. There are, perhaps, from 200 to 300 fat cattle in a week coming from Denmark to Scotland, and I think that there are very likely between 2,000 and 3,000 fat sheep, and it is impossible that those sheep or cattle could be slaughtered on landing. I am afraid, so far as the fat cattle markets are concerned, that they could not well be suspended in large towns where the stock is consumed, but where, in the north of Scotland, there are what are called weekly or monthly fat markets, I think those might be all stopped.

3128. The Commissioners have been informed that a considerable quantity of meat comes up from Scotland to the London market ; is that the case ?—Yes.

3129. And that the animals are killed on the farms

where they are reared?—No; that is not so; they are killed in Aberdeen and in Glasgow or Edinburgh, or at the large slaughter markets, or they may be killed, perhaps, at Dundee, which is another large place. The other thing is impossible, because there is not accommodation for killing them at any of those farm places. I have mentioned this at every meeting I have attended. I do not believe that the veterinary surgeons sustain the view which I take as to the spread of this disease.

3130. Do you not believe that cattle that are sent to market for slaughter are very often driven away, and that they afterwards graze in pastures or fields?—Yes; and I think that that should be stopped.

3131. You think that is practicable to stop this?—Yes, perfectly so, in these times. It may be an inconvenience or hardship to some parties, but I think that any man having any regard for the country would not complain. I believe it is quite easy to stop it.

3132. How would you propose to work a system of slaughtering the animals, and not allowing them to leave the town where they are sold alive?—At Glasgow I have recommended that they should have a market there on Thursday and Monday. I was sent for by the provost of Edinburgh, and Professor Dick was present, and they asked me for my opinion, and I said that I thought it might do very well, if, instead of a butcher buying his weekly stock on Wednesday, that in Edinburgh he should purchase them on Monday and Wednesday, and in Glasgow on Monday and Thursday. The animals could be sent to a slaughter-house, and they might be fasted for one or two days before they were killed.

3133. How would you know that an animal was not driven out of the town when it was taken from the market place, even although a mark was made on its tail?—I proposed to the lord provost of Edinburgh and the magistrates to put a brand on them, and I would propose to do the same thing with the cattle in every fat market in Scotland. I would prohibit them from going out to grazing fields, and an Order in Council might be issued saying that they should not be allowed to go out.

3134. Would it not be necessary to put a stop to all private slaughter-houses, and that the whole matter should be put under the supervision of the lord provost?—We have it so in Edinburgh just now; no beast is allowed to be slaughtered, I think, within a mile of the city.

3135. Are there not private slaughter-houses within the city?—No.

3136. What view do you entertain with regard to the disease?—I have observed very often that in every district, if a man's stock is affected, they take away the diseased animal; but I am sure that any professional man knows, that if a fever or cholera breaks out, those who are unaffected are removed; or, take the case of soldiers abroad, if cholera breaks out among soldiers, or any other fatal disease attacks them, they remove the whole of the troops to a different station. Now, as I have argued, let a diseased bullock be taken care of; and with regard to the clean cattle, treat those cattle the same as if they were all diseased. So far as I have seen of this disease, the third stomach of the animal, after the disease gets to a certain length, is as hard as a stone, and no medicine, when the disease reaches that stage, if of any avail; but if the cattle are taken care of in time, and get some of what is prescribed by Professor Dick, I believe they could be cured; but that is a matter which I think has been overlooked altogether, although I have brought many of our large stock-holders to do it. I hold this opinion, that if men in these times do not put themselves about a little they will lose all their stock. Another thing is, with regard to the disease in sheep. Immediately after the report that Professor Simonds made to the Privy Council, I was much struck; and with a deputation I went to the lord provost, and had an interview with him. I then went to my own farm, and I took out two four-year old wethers from Sutherlandshire out of a flock of 700. I took out two from Orkney; I took out two young Swedish sheep; two half-breed Denmark sheep; and I took out two cross-bred lambs from Roxburghshire, making ten in all. I went to the Town Council, where there was a full meeting, and I asked to have an interview with the lord provost and the magistrates. I saw them, and I told them that I would give them those animals for the purpose of making an experiment, and it was arranged by Professor Dick that the sheep were to go down there. I put men in charge of them night and day in the sanatorium, and they were put in, I think, 14 hours out of the 24; they went in at six o'clock, and came out at eight, and I believe this is the 16th or 17th day, and they are as well to-day as when they went in. My reason for doing this was, that the whole of the sheep farmers in Scotland were in a state of panic; and I knew the nature of sheep, and I intended to go into the county of Norfolk, to see the lambs that were reported upon there; but I have not been able to get away on account of being too busy. My own opinion is, that those lambs must have been changed from one place to another, and that they must have been hungered, and afterwards put upon marshy grass or bath where cattle had previously been grazing. I do not believe that sheep will be seized with the same disease as that which is called Rinderpest. My reason for doing this was also that we had sold a deal of sheep stock to go to Ireland, and also to Germany, and I wished to try, if possible, to relieve the sheep farmers from the anxiety which they felt.

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3137. Do you believe that sheep can communicate the disease to bullocks or cows?—I cannot give an opinion upon that point; but that has to be tried. I have received orders to send five clean bullocks in, and these 10 sheep are to be put in contact with them; but I am afraid it will not stand good, for this disease is very fatal; none is so fatal as it; and I am satisfied that the infection will be communicated in the wool.

3138. With regard to the cattle trade of Scotland, there are, I suppose, large breeding districts in Scotland, where all the Scotch animals that are in England come from?—Yes.

3139. Is the season past when the animals leave these districts to be sold in different parts of Great Britain? At the last Falkirk Fair I pressed upon a man to slaughter some cattle, for he was actually going to take them back into the middle of Argylshire; a Mr. Macdonald; and I said to Mr. Phillips that they should send off immediately to the Duke of Argyle to get them stopped, and that they had better shoot them. The man said that nobody would buy his beasts, and what could he do.

3140. Is the season past for those animals to be sold?—No. The Doon Fair is a very large fair, and it will be a matter of great consideration here, and in the south of England, and in Cumberland, and in Dumfries-shire; all these stockholders are graziers, and their grass will be finished, and we do not know what is to be done with the cattle.

3141. What will be the effect of stopping the store fairs on the breeders of those cattle?—What we have done, or advised to be done, is this, that wherever there is a clean herd of cattle the parties are to let us know, and then we shall try to arrange with the parties in want of the stock. Before I came away there was a man that grazed a large herd there, and I sent my son into Dumfriesshire, and he sold 100 of those beasts. In such a year as this I do not think that the animals can be allowed to congregate together; there must be proper care taken, and I think that if the farmers in every county were put into divisions, they could manage much better, and not to call in the veterinary surgeons, to give the veterinary surgeons the power, and the farmers to have nothing to do with it.

3142. Does the trade in store cattle continue later than this month?—Yes; until about the middle of

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November. Hallow fair is held about the 10th or the 11th, and that will be the last fair but one that we have in Scotland for the year.

3143. (*Mr. Lowe.*) (*To Professor Dick.*) Do you see your way to the end of this disease, or do you see any chance of getting rid of it?—I do think that in a little time it will disappear.

3144. What is it that you rely upon?—Upon a change in the weather. I have an assistant who is a native of St. Petersburg, and he informs me that in St. Petersburg, when the cold weather sets in, the disease subsides.

3145. Evidence has been given here quite to the contrary; and suppose that that hope fails us, what else have you to rely upon?—To endeavour to treat it. I think that with a little further experience we shall be able to treat the disease more successfully than we have hitherto done.

3146. But suppose we do not succeed, and do no better than the Austrians and Russians have done, can you point out anything else that might be attempted?—My plan of treatment is this: On examining the pathological condition of the animal, I find, first, that the first and third stomachs are overloaded with food, and I commence therefore by the administration of mild purgatives, followed by stimulants, and after that, tonics. I have done this with a tolerable degree of success; and in cases where the disease has been a little more advanced, and where purging has set in, I have commenced by giving a dose of oil, and then following that up by lime water and tincture of opium.

3147. You cannot announce to the Commission that you have discovered any method of treatment that is satisfactory to yourself?—Not thoroughly so, but I think it approaches to it.

3148. Supposing your mode of treatment does not turn out well, can you point out any other hope that we have?—I do not see any other method, excepting that which I have indicated, and which seems, from various cases, likely to succeed; for instance, there is one man at Hamilton Place who had six animals taken ill, four of them have recovered, and he seems so sanguine about the recovery that he is about to buy in fresh stock.

3149. Can you state what per-centage you have cured?—The per-centage has been very small; not above 10 or 15 per cent.

3150. Passing by the treatment, and supposing you do not succeed in discovering a remedy, can you point out any other means by which the disease can be overcome?—I think I would have some hope that in placing them by themselves, and keeping them separate from all other stock, and leaving them to themselves, a good many might recover.

3151. Those that were visibly attacked?—Yes.

3152. What would you do with animals which had the disease in a state of incubation; might not they communicate it to others?—If they were in a state of incubation I would adopt means to purge them, and put them through a course of treatment in the way I have mentioned, as a means of throwing off the disease.

3153. (*Dr. Playfair.*) Has there not been a medical committee of the most eminent medical men appointed in Edinburgh to assist you in the investigation of this disease?—Yes.

3154. Have they directed their attention to the sanatorium at all?—They have not visited it yet.

3155. In spite of all the assistance which you have had from your college in regard to the sanatorium, you have not been very successful in the cure of the disease?—No; but that has in a great measure arisen from none but advanced cases being sent in.

3156. In the whole of Edinburgh you say that the success has not been more than 10 or 12 per cent. altogether?—Thereabouts.

3157. (*To Mr. Swan.*) Although you would put down lean cattle markets, would you allow the movement of cattle between farm and farm?—What I mean to say is, since the cattle are all stopped, that East Lothian farmers may require many hundreds, and they want them just now; and if the sheriff or the convener of the county, or both, were to call the principal stockholders together in each county, let the farmers, or the sheriff, instead of putting full powers into the hands of inspectors, without knowledge, let the sheriff or convener, or both, and a certain number of farmers, see that the cattle are healthy.

3158. Do you mean to give a clean bill of health?—Yes; and to let no man remove his cattle without the leave of the sheriff, and let no cattle go into any county without they were clean.

3159. You would allow the fat cattle to be sold and slaughtered in the market?—Yes.

3160. Would you allow the clean cattle to pass over the same roads that the diseased fat cattle had passed over?—Not likely. I think that no clean beasts should be allowed to travel where any diseased beasts had been near.

3161. But how could you prevent that?—It would be well known. It would be known throughout the country wherever the cattle were diseased.

3162. If you allowed live markets for fat beasts to be slaughtered there, and permitted the movement of lean cattle from one farm to another, how would you prevent the lean cattle passing over the same roads that the fat cattle had passed over?—Most of the lean cattle districts are not localities where cattle are fed.

3163. Taking the case of the Lothians, would you allow any movement of cattle on the roads in the Lothians?—Not if there was any disease there; distinctly not.

3164. You would not allow it if there was any disease at all in the Lothians?—Not that they should come near where there was any disease.

3165. Do you think you could keep the fat cattle quite away from the roads over which the lean cattle travel?—Yes; I am sure of it, if you gave the farmers the power. I hold that every farmer who has stock is as anxious about this matter, and more so, than other people; but to take the power out of their hands, and to put it in the hands of an inspector, who has merely got power from the Privy Council, and is not a judge, I do not think would be the best thing.

3166. Do the farmers possess any more knowledge of the symptoms of Rinderpest than the veterinary surgeons do?—No; but it is a disease which I think the veterinary surgeons do not understand, and that has been found out. We are looking to them, and to medical science, to furnish us with a prescription.

3167. Why do you think that the farmers would have more skill than veterinary surgeons in the case of an unknown disease?—They know when there is no disease, and they are very anxious to keep it down, and they think, in the way of appointing veterinary surgeons, that the Government should pay for this; but every time that I hear this, I think it will be the greatest affliction that ever they can meet with if they allow the Government to take possession of all the stock in England.

3168. You would throw it upon the localities entirely, and not upon the Imperial Government?—Yes; I think that the stockholders should protect themselves.

3169. Do you think they can do so?—I think they can do it in a great measure.

3170. If they are in the least degree negligent, and leave one infected cow in a district, will not that cow become the centre of infection?—Yes; but I think they have more power, and are better able to do what is necessary, than if you gave power to a man who did not know, and who had had no practical experience. Let the farmers have a few assistants; let them call in assistants; and let them apply for medicine to Professor Dick or to the head college in Edinburgh, and let them do the same in England; let them apply to Professor Simonds, or to the Veterinary College in London.

3171. Do you believe that the farmers are more skilled and able to manage these matters than

veterinary surgeons are?—I do in this particular disease.

(*Professor Dick.*) I may mention that a great number of veterinary surgeons have come from different parts of Scotland to Edinburgh to see the cases, and I have invariably given them an opportunity of seeing them.

3172. (*Mr. Wormald.*) (*To Professor Dick.*) I think you stated that you would remove the sound cattle a reasonable distance from the diseased ones; will you state what you consider to be a reasonable distance, for it is rather a vague term?—It would depend upon circumstances, whether they could get them placed at a greater or a less distance; but I would say that if you could get them 100 yards from the others they would be quite safe, provided they were kept totally distinct.

3173. Would you adopt any medicinal measures with regard to those cattle which had come within the influence of diseased cattle, speaking now of sound cattle?—I think it would be very advisable in the case of sound cattle, where they had come from an infected district, to administer a dose or may be a couple of doses of purgative medicine, and also some alterative medicine afterwards.

3174. Why do you say it would be advisable to administer alterative medicine?—Because I find in all the cases of animals that are affected the paunch and the first and third stomachs are overloaded, and I would therefore say that by unloading the stomachs you restore them to a healthy condition, and digestion will then go on freely.

3175. Has it been observed as a premonitory symptom that the dung of the animals is in any way changed, either in consistency or in calibre?—It is changed in the first stages of the disease; there is a quantity of mucus on the dung, and there is sometimes a degree of constipation; one of the earliest symptoms is purging.

3176. Is the calibre or the circumference of the fæces less?—At first I will not say that there is much difference in regard to the quantity.

3177. I am speaking of the size or circumference of the fæces?—If there is a degree of constipation they are perhaps a little contracted.

3178. These are the earliest symptoms?—Yes.

3179. (*Mr. Ceely.*) I believe that flies are very apt to settle about the infected animals?—Yes; and I would remark that this summer flies have been more abundant in Scotland than I ever saw them in any season.

3180. Do you think it is possible that flies attaching themselves to the secretions about the nose and eyes might become vehicles of communication, and so inoculate other animals with the disease?—I have great doubts about that. It is quite possible that they might communicate the poison from one animal to another; but I have no certainty of anything of the kind.

3181. In such a case a distance of 100 yards would hardly be sufficient to protect the animals from such an influence?—No; but I think that might be obviated by simply having the kye or the oxen dressed with a mixture of train oil and naphtha; the flies would scarcely approach that; and I think that a very little of it placed on the head and along the back would completely prevent the flies from attacking them.

3182. In the post-mortem appearances of the animals I suppose there is a general character, but no uniformity?—There is a tolerable degree of uniformity. We always find a considerable injection of the mucous membrane, and the first and third stomachs are impacted; and in some instances we have found circular rings of apparent inflammatory action on the folds of the third. But Professor Spooner tells me that he has had some cases in which there have been large patches, and the have been ulcerated, and the edges have cicatrized, and healed up completely. We have not met with that in our dissections. The whole of the intestinal canal is also highly injected; and there is in the latter stages a kind of bloody discharge with the fæces.

3183. (*Mr. Read.*) Are not the cowhouses in Edinburgh a frightful source of generating disease among the cattle?—I think they really are. They are very unwholesome.

3184. Would you abolish them?—You cannot abolish them altogether; but it would be a great matter if they could be improved in some way, or they might be removed beyond the bounds of the town.

3185. Would you not remove them from the city?—I know that some of them are so low in the roof that you can scarcely walk into them.

3186. You have removed the slaughter-houses, but you keep the cowhouses in the city of Edinburgh?—The slaughter-houses are within the city, but the cowhouses I would remove. The slaughter-houses are under very good regulations, and are well taken care of.

3187. I thought you stated that the slaughter-houses were outside the city walls?—No; the private slaughter-houses are abolished.

3188. Do you know how many cows Mr. Shaw brought from the Metropolitan Market?—I do not remember.

(*Mr. Swan.*)—I think there were 17 the last time; he was there three weeks; but in the fatal lot I think there were 17.

3189. (*To Professor Dick.*) Did you not trace the disease in every one of those cows?—In most of them.

3190. When you say that you think there would be found some mode of successfully treating this disease, do you not ground that opinion rather upon your future hopes than upon your past experience?—It is from my past experience and knowledge of the pathology of the disease that I think it is within the reach of medicine, although it will always be so far fatal, depending upon the parts affected, and the severity of the attack; but seeing that the disease affects the stomachs, if we can see the case early, and can remove the source of irritation from the stomachs and bowels, I think there is great probability of recovery, and in some cases where they have been vigorously treated I have seen them recover pretty rapidly.

3191. In your actual experience I think you stated that you had not cured more than 10 or 15 per cent.?—Certainly not; but then the cow-feeders are such a set that you do not get information sufficiently early to have a chance of doing good, and in the sanitarium you can never get them until they have been two or three days ill, and the consequence is that we have but little success there.

3192. The measures you would resort to would be preventive rather than curative?—I would recommend preventive means more than curative, because, if you can prevent the disease, you will get more easily quit of it.

3193. (*To Mr. Swan.*) I think you stated that the outbreak in the neighbourhood of Berwick took place as early as the 18th of July?—It was in July, and the cattle that were taken out from there were shown at St. Boswell's Fair on the 18th of July, and they were sold at Kelso on the Friday following to Mr. Henderson.

3194. Was that outbreak distinct from the outbreak in the Edinburgh dairies?—Yes, this was.

3195. I understood you to say that these were imported cattle?—They came from London; they were bullocks that came from London.

3196. And they had nothing whatever to do with the Edinburgh dairies?—Not the cattle that came to Berwick. The man who bought them showed me the stance yesterday in the Metropolitan Market where he bought them. His name is William Cockshot.

3197. Do you think it would be impossible to stop the transit of all store cattle for the next six weeks?—I am afraid it would be ruinous to a great many; but it may be done, I think, with perfect safety.

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3198. Are you aware that in Norfolk we now require, or shall require in the next three months, some 30,000 head of lean stock to graze?—We send a good deal to Norfolk, and I know the requirements of the Norfolk people; but for such a distance as that I do not think it would be safe to send cattle, or from any distance from one country to another, where it is known that the disease is not existing.

3199. You say that you would abolish all store markets; would you include sheep?—Sheep could be sold well without going into the fat cattle market. I can scarcely give an opinion upon that until the experiment has been concluded in Edinburgh.

3200. If you abolished all store markets, it would be as well, would it not, to abolish the sheep markets?—I am quite satisfied of it; and if the Commissioners are that way disposed I should be perfectly willing to give my sanction to it, for I hold distinctly that we have plenty places in the neighbourhood of Edinburgh for the purpose, without bringing them into the fat cattle market.

3201. I suppose you are aware that sheep do convey the disease?—I am not sure of that; but I should think that the sheep I have spoken of may have it, and that it would be unsafe to be tried with the five cattle; I am almost sure that they will carry the disease to those clean cattle.

3202. You think that they will?—Yes.

3203. Although you think that sheep would not take the contagion, they might carry it in their coats?—Yes. In ordinary circumstances I do not think so; but in this case the sheep and the cattle have been lying for 16 days night and day together, and I think it will be carried.

3204. In this case you think they will carry it?—I think they will.

3205. I understood you, in answer to Dr. Playfair, to say, with regard to the transit of store cattle, that you would have certain infected districts, as it were, proclaimed, and that no store cattle should be allowed to pass through them?—Neither out nor in.

3206. By taking that step you think that the transit of store cattle might be continued?—I think so.

3207. Without running any great risk?—Yes.

3208. (*Chairman.*) (*To Professor Dick.*) Do you consider the Rinderpest a more serious outbreak in Great Britain than the pleuro-pneumonia or the foot and mouth disease?—I think that the pleuro-pneumonia has been more fatal as yet than the Rinderpest.

3209. That is with regard to the past; but with regard to the future, we have only just had an outbreak of the Rinderpest?—The pleuro-pneumonia depends a great deal upon the seasons, and would vary according to the seasons.

3210. That is hardly a direct answer to my question. Taking it in every way, in hot weather and in cold weather, and taking an equal time of duration in the country, which do you consider the most serious, the Rinderpest or pleuro-pneumonia?—The Rinderpest.

3211. (*Dr. Jones.*) How many post-mortem examinations may you have had of the rinderpest since August?—I have had at least a dozen, but I could not speak positively about that. I have had them very frequently without taking any note of them. I have only just examined them. We have had very frequent opportunities, but I cannot say positively how many. I think there would be at least twenty.

3212. (*Professor Spooner.*) I presume you act in the capacity of inspector in Edinburgh?—Yes.

3213. Speaking of prophylactic measures, and the difficulty of meeting with cases in the early stage of disease, in the event of disease breaking out in a large dairy, and showing itself in one or two cows, are you not empowered as an inspector to prescribe for the other cows?—Yes, and we do so.

3214. So that in that case you would have an opportunity of treating the disease by prophylactic measures?—I have done so in some cases, and I have found it to have been with good success, but we have no certain proof that we have succeeded in those cases. There was one case at Corstorphine where two cows were affected, and I think there were 20 others in the byre; these were ordered medicine; and they all got round; but in that case the others were separated from them, and they might have got round without any treatment, because I hold that sometimes they get round without any treatment.

3215. Have you had an opportunity of observing any difference between those cowsheds where prophylactic measures have been resorted to and those where no such measures have been adopted?—Yes, I have, although not to a great extent. You cannot depend upon what the cowkeepers say or do; they very often undertake to treat the animals themselves, notwithstanding the orders I may have given.

3216. Supposing your attention were directed, we will say, to two sheds, each containing 20 cows, and in one shed or in each of those sheds two of the cows had undoubtedly shown evidence of the disease, and suppose that in the one case you were to adopt the prophylactic measures which you have suggested to the Commission, and in the other case you were to leave it entirely to nature; what do you think would be the difference in the result?—I do not remember any case exactly parallel to the case supposed in the question. I have mentioned the case at Corstorphine, where there were two cows that had the disease among 20 which had medicine, but I do not remember another byre of the same size where you could get them to do that. In the case of one byre, I ordered medicine; but there was a chemist and druggist in Edinburgh who had held out that he had a remedy, and the owner of this byre, who had a good many cows, and who had wanted to treat them in that way, and he went and got this medicine from this druggist, and treated them himself, and they all died.

3217. Do you think that the mortality in the one case where they had submitted to your directions would be greater than in the other; that is to say, would the mortality be greater in the case where the cows were not submitted to treatment than in the case were the cows were submitted to treatment?—I should state that I have observed that cows will often get well of themselves; and it is quite possible that in a good byre, by attention to diet, cleanliness, and covering, they might recover without medicine, although I would always expect that the exhibition of moderate doses of laxative medicine would be attended with advantage.

3218. (*Chairman.*) Have you anything further to suggest to the Commissioners with regard to the disease and the remedies to be applied?—I do not think I have anything more in particular to say.

3219. (*To Mr. Swan.*) Have you anything particular to suggest as to remedies for the disease?—One thing I would suggest is, that the Royal Commission should order an analysis of this Rinderpest beef; we are so anxious about it; it is unknown what it is in its earliest stages, and if it gets amongst those fine fat cattle, worth 20*l.*, 30*l.*, or 35*l.* each, the public is anxious to know whether it is wholesome or unwholesome beef in the early stages. If it is unwholesome, the farmers would be quite satisfied that the meat should be destroyed. Of course coming from the Royal Commission, who would be sitting until such an analysis was made, it would come with very great authority. There may be valuable animals that perhaps would be destroyed, but it is very important that some information of that sort should come out.

3220. Is there anything else which you would suggest as to immediate remedies?—There is another thing that we should do. The sheriffs for every county in Scotland are entitled to have the prescribed medicine put in their power, and they ought to know how to treat cattle. At the present time they are at a loss to know what do do; and we are now looking to the veterinary or the medical profession to give us a prescription, to let us know how to treat the animals if the Rinderpest comes amongst the cattle.

The witnesses withdrew.

Mr. James Burchell examined.

3221. (*Chairman.*) You have been a good deal in Russia; have you not?—I have.

3222. Are you well acquainted with Esthonia?—Yes; very well.

3223. Your attention, I believe, was drawn to the desirability of importing Russian cattle into this country?—Yes.

3224. And you communicated to Mr. Hönck and Mr. Baker upon that subject?—Yes.

3225. What was the result of your communication to them?—That I could get fat oxen and fat sheep there at a reasonable rate, and that I made a contract with the Esthonian Society for 800 fat oxen and 800 sheep.

3226. What followed?—Mr. Hönck and Mr. Baker agreed to give me a third share in the profits resulting from the sale of those sheep and oxen to be sold in London, and I went to Russia, and brought over a cargo of 321 oxen and 329 sheep.

3227. Where did you purchase those animals?—In Revel, at a meeting of the Esthonian Society.

3228. What passed upon the matter between you and the Esthonian Agricultural Society?—They agreed to give me 800 oxen for four copecs per pound of living weight, and there are three copecs to a penny, and 800 sheep.

3229. Without going into the detail of the contract, it resulted in your coming to an agreement with Mr. Hönck and Mr. Baker, and you returned, I believe, to Revel?—I did.

3230. What did you do then at Revel?—I went and looked through the oxen, to see how they were feeding them, and I showed them how to keep them, and so on. They are very ignorant and very careless, and so I went to show them how to keep them.

3231. Where did you go to communicate that information?—To several estates in several parts of Esthonia; in fact I have been over most of it.

3232. What was the number of cattle that you collected at Revel?—The society brought me 640 oxen into the yard to select my 400 from, but a great many of them were very lean and sick, and one thing and another wrong with them.

3233. Did those 640 come only from Esthonia, or did they come from other parts of Russia?—Some of them came from other parts near St. Petersburg.

3234. Will you state what number came from near St. Petersburg?—Forty-six.

3235. In what condition did you find those 46 animals that came from St. Petersburg?—They were very good.

3236. Were they healthy?—Yes, they were, with the exception of having received some damage in transmitting them by four-horse waggons to the yard.

3237. Will you be good enough to state from whence came the actual cargo that you put on board the "Tonning?"—They came from Revel from and near St. Petersburg, and I sold four in the yard, two for having the foot disease, and two for being sick. The society forced me to take all sorts of rubbish, which I protested against, and I went to the burgomaster, and got him to interfere, and he gave me two experts, or rather I should say three judges, to assist me against the society. The society stopped my passports, and brought me before the justices, and did everything they could to intimidate me to make me take the full number, in order that I should not fall back on them for short delivery.

3238. Of the actual cargo that you took to Hull how many animals came from St. Petersburg?—Thirteen.

3239. Did you make any inquiry at the time as to whether there was any disease among the cattle in Esthonia?—No; but a gentleman told me, and I knew, of one case where 30 beasts had been feeding for me, and one caught the disease and died, and the gentleman supplied the place by another for which he paid 40 roubles.

3240. What disease?—The complaint; but it does not affect them in that country the same as here.

3241. What complaint?—The regular Russian complaint; purging, and running from the nose.

3242. Was it the identical complaint that is now raging in England?—That I do not know; I could not say. I have not seen one beast affected in England by the plague, but I believe it to be the same. Several gentlemen spoke to me about their oxen dying.

3243. Did you see any cases of this illness when you were in Esthonia?—I did not, except two; one that came in the ship, and one that was bad in the yard.

3244. What were the symptoms that you saw?—They stood with the back up, and they had a running from the eyes and from the nose, and were scoured.

3245. Are the symptoms that you are describing those of the animals that died in the yard?—Of the one that I sold and the one that died in the yard at Revel; and they brought me before the justices to try to make me pay for it. I had not weighed it or received it, but they tried to insist upon my paying for it.

3246. Where was the animal that you saw sick with its back up?—In the yard amongst the others. In fact, I noticed some of them sick, but I did not make any remark. I only passed them away as well as I could, for it is not a very virulent complaint in that country. They never take them out of the house when they get sick; they leave them amongst the other cattle.

3247. What did you think at the time was the matter with the animal?—I thought that it was some serious complaint, so that it would not be suitable to take it to this country,

3248. Did you think it infectious?—I did not. I did not understand anything about it.

3249. Have you not had the curiosity to go and see any of the animals that are suffering under the disease now prevalent in England?—No, not one. I have not known where to go to see them.

3250. What reason had you to think that the disease was the Rinderpest?—From the description that I have heard of it since, from the running from the eyes and the nose, and the discharge, and the description that some of the gentlemen in that country had given me.

3251. Was this animal that fell sick one that came from Esthonia, or one that came from the neighbourhood of St. Petersburg?—I rather think that it was one of the St. Petersburg lot.

3252. Can you answer that question more definitely?—No, I could not be positive.

3253. Was the attention of any veterinary surgeon or of any Government officer attracted to the circumstance?—Not one. All the attention it attracted was to force me to take them, both bad and good.

3254. If they tried to force you to pay for the animal, they would probably remember the case, if it was alluded to?—Of course they would, if they wished to do it; but they were very anxious to try to conceal it as much as possible, because I believe that they had another contract entered into with the firm of Hönck and Baker. When I got the short delivery of 103 oxen and so many sheep, I made a protest in Russia about it, and I wanted to go to law for the short delivery; but Mr. Hönck told me that he was making another contract with them, and he asked me not to make any noise about it until he had got settled for the other lot.

3255. Will you state the date of your leaving Revel?—The 23d of May last.

3556. Did you touch anywhere on your passage to England?—Yes; at Copenhagen.

3557. Why did you touch there?—On account of some scheme, I could not understand what it was, for the oxen were entered in the manifest as for Lowestoft, in order to cheat the Government here, so as to make the Government believe that the steamer would land the cattle at Lowestoft; but they were never intended to go to Lowestoft; they were

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landed at Hull, and were never examined by any veterinary surgeon there.

3258. What was the result of your touching at Copenhagen?—We got a little hay there, which we did not require, and some water; but the result was that there was a telegraph for Mr. Hanson, an agent of the owners of the ship, to the captain, to put in at Hull.

3259. When you left Revel to what port did you expect to go?—According to the letter of Mr. Hönck to me, stating that to avoid the doctors they were going to Lowestoft, I fully expected they were going to Lowestoft, and I reasoned with the captain about going to such a port, and incurring expense there; but he said, "You have nothing to say to it; I have the "directions of the owners of the ship."

3260. Did anything particular occur with those cattle on the voyage?—Nothing more than that one of them got very unwell, and I had to get some brandy for it.

3261. Did the animal survive the attack?—Yes, he lived to come to London, and he was sold in the London market. He was a good four-year old ox, and Mr. Hönck said that he would keep it for grass, but I said, "Do not attempt to keep it, as he has been "unwell already."

3262. On what day did you arrive at Hull?—On the 29th of May.

3263. On arriving at Hull were the cattle inspected by the Government officers?—No, certainly not; if there were Government officers there there could be no inspection when 321 beasts were turned out upon the quay loose, and men stopping them in front, and the animals going about all the time. There were rails along the landing place at Hull for the purpose of tying the oxen up to be examined. I do not know for certain, but Mr. Hönck had been down to Hull before the arrival of the oxen, and to the best of my belief he arranged with the inspector to be out of the way.

3264. Do you know the name of the inspector?—I do not; but if the cattle were examined they should have been tied up in a row. No man could examine 321 oxen as they were, all loose on the quay, and the men stopping them and beating them.

3265. Did they attempt to examine them?—If they did I should have seen them, as I was there all the time.

3266. What became of them?—I drove up with them to a field outside the town; they were watered in the yard, and put into this field, and then, contrary to my wish and protest, a man named Coulson, a salesman of Hull, draws 120 of the best beasts, then he takes 14 out of those 120, and sells 106 at 11*l.* 10*s.* each. I telegraphed to Mr. Lambert, a first-rate salesman at Manchester, to look after the sale of the oxen; and he writes to me to say that they were sold in less than an hour; for over 14*l.* apiece. They weighed 15, 16, and 17 cwt. apiece, and were fine good fat oxen.

3267. What became of them after Mr. Coulson bought them?—He sent them on to Manchester that same day, the 29th; he sent 106; he drew 120 of the best, and he turned back 14 of the worst out of the 120.

3268. I thought the number was 146?—There was a man of the name of Hickman that got 40, and they were sent on to Manchester, and they were delayed by the railway, so that they were not in time for the Manchester market, and they had to go Wakefield, and were sold there for 13*l.* 5*s.* apiece.

3269. To whom were they sold?—That I could not answer. Mr. Hickman could tell that.

3270. You never traced them any further?—No; nothing further than the sale. I have Mr. Hickman's letters of the sales, but he does not state the names of the parties to whom he sold them.

3271. Have you never found whether any disease has been directly traced to those animals?—No, I never did; it is out of my way.

3272. Was the sick animal, or any of the animals that came from St. Petersburg, among those animals which were sent to Mr. Hickman?—Yes; the sick animal came direct to London, and it stopped one day and one night in Maiden Lane.

3273. Did any of those animals which came from St. Petersburg come to London?—Some of them.

3274. Some of them were sold to one of those gentlemen?—Yes; Mr. Coulson drew out a lot of them.

3275. Then the remaining 175 came by rail to London?—Yes; they were sold here in the market.

3276. It is the case, is it not, that 20 were sold on the 31st of May by Mr. Baker?—Yes; he took them out of the yard at Maiden Lane to go to Gosport, and the remainder were sold the next day in the cattle market on the 1st of June.

3277. Have you ever been able to trace them further than that sale?—No; but I have no doubt if you were to get Mr. Lambert of Manchester and give him notice he would be able to find out where they went; he is a very extensive salesman; and there were a lot of 328 sheep that went there too.

3278. What became of those sheep?—Mr. Coulson sent them to Manchester, and they were sold there, the whole lot, I believe; at least they were returned as sold at Manchester at 13*s.* a piece. They were four years' old wethers with a year's wool on, and on the cargo Hönck and Baker returned me a profit of 15*s.*

3279. Where did you get those sheep?—All in Esthonia. There were a good many lambs dying when I was in Esthonia that winter.

3280. Of what disease?—Scouring.

3281. Do you believe that the Rinderpest was communicated by this cargo to England?—I am of opinion that it was, because coming from such a distance it could not be communicated very well in the air; it must have come in the skins or in the systems of some of the animals. And again, the way in which they crowd those animals on board the boats is fearful. We had 10 on deck for four days, and on that voyage the steamer only carried 321; whereas now she is carrying 340, and 1,300 sheep, so that it is fearful work; it is packing them in like herrings.

3282. Have you been much connected with the cattle trade?—Yes, a great deal, for many years.

3283. In what way?—Buying and selling.

3284. (*Mr. Read.*) You stated, did you not, that the best cattle came from St. Petersburg?—They did.

3285. If there were 46, how came you to select only 13?—Because they were injured in their backs and loins from being in waggons; they were carried in four-horse waggons to be in in time to supply the contract.

3286. How far is St. Petersburg from Revel?—350 versts, and there are $1\frac{3}{4}$ versts to a mile.

3287. You say that the 640 cattle which came from Esthonia were sick and lean?—Miserably so; some of them were scarcely able to walk, and I had seen many of them lying about the roads in the streets. Not speaking much Russian, it is a very difficult thing to learn what is going on in the country; there they speak Esthonian, Russian, and German.

3288. You say that you sold four cattle in the yard at Revel?—Yes; to a butcher.

3289. What for?—For being sick and lame.

3290. That was after you had purchased them?—Yes, after I had purchased them, because they insisted upon my taking them. They stopped my passport, and thought to frighten me very much. It is an awkward thing to be in a country like that, and to have your passport stopped, and you doing no harm. I have had all the papers connected with the matter, and I sent them to the Government of this country, to see if I could get redress, but they said that they could not interfere.

3291. You think that the cattle which you sold to the butcher were suffering from the disease called Rinderpest?—Yes; two of them, from what I hear of it since. I have never seen a beast affected with it in this country.

3292. I suppose you have read a description of it?—Yes; and I think that it is quite similar to what I saw in Russia.

3293. Do you mean to say that the disease is common in Russia?—Yes; it is very common in Russia, but not so virulent as here. It will go into a house where there are 100 beasts, and only kill one of them, or 50 beasts, and only one will die; but it is always brought down from the steppes, where the plague is indigenous. The Esthonian and Livonian men are obliged to get down those steppe oxen. They are so much larger to feed, and they fatten better, and the plague is generally communicated by them; they bring some disease with them. Our vice-consul and his brother belong to the committee. He is a Russian, named Girard, and his brother is another member of the society.

3294. (*Mr. Ceely.*) I think you stated that the ox that was sick on board recovered?—It lived so far as to come to London and be sold here.

3295. Do you think that it had the disease?—I do, and I said so at the time.

3296. It had a running from the eyes and nose?—Yes; and it was so when it came to London.

3297. At what time did it come to London, do you recollect?—On the 30th of May.

3298. (*Professor Spooner.*) You have not said on what day after your starting from Revel this animal was attacked?—On the 28th of May the ox took unwell.

3299. You arrived in Hull on the 29th, so that you had only two days to treat it?—Yes, that is so; the 28th and the 29th. In fact, I gave it no treatment whatever. I only turned it out amongst the others when I landed at Hull, but on board I gave it plenty of brandy.

3300. What were the first symptoms which drew your attention to that ox on board the ship?—His lying down so much, and refusing his hay and water.

3301. Did he chew his cud?—No.

3302. Did he purge?—He did.

3303. I believe none of the animals purchased by you were actual steppe oxen?—Not one of them was a steppe ox that I purchased, I believe, because the colour of the steppe oxen is a sort of grey.

3304. Have you really yourself seen the disease called the Rinderpest affecting any animals in Russia?—No; only the one in the yard that I sold, and this one which I had on board. I did not see any in the houses.

3305. You have had considerable experience, have you not?—Yes; I have been through a great many of the houses, but then perhaps they would not let me see them; they were very cautious. I only looked at those that were put up for myself to feed for me. I did not remark any oxen that were in the houses. I did not go to look at them; only at those that were put up to feed specially for me.

3306. Can you assert to this Commission, that in your belief those animals which you sold at Revel to the butcher were affected with the Rinderpest?—One of them I can; at least that was my belief at the time.

3307. And you knew at that time that that disease was a highly infectious disease?—I did not; I knew nothing of that. I could not know anything of it. I did not know that it was the Rinderpest at the time, but from reading a description of it since, and hearing of it, I believe it be so now.

3308. I want to know whether at the time that you disposed of this animal to the butcher you were conscious that it was suffering from the Rinderpest?—No, I was not; I was conscious that it was a disease, and it appeared to me that he would not stand the voyage, and that I should be much better without him, and I never should have had him if the society had not forced me, and stopped my passport, and insisted upon my taking it.

3309. (*Dr. Playfair.*) How many days before you embarked was it that you sold those four beasts?—Three days before I embarked I sold three, and one the day before I embarked.

3310. Do you recollect which one it was that you sold the day before?—Yes; it was the sick one the day before.

3311. How long had that sick beast been in your yard?—About four days.

3312. And the voyage occupied six days; did it not?—Yes.

3313. Then there would have been ten days between the time that this infected beast was in your yard and the time of arriving at Hull?—Yes; it would be so.

3314. Do you know that the time in which the disease is communicated from one animal to another is eight days?—No, I do not.

3315. If that is so, would you not have expected, if it had been the Rinderpest, that it would have been extensively distributed amongst the other beasts in the yard?—No; because very few oxen are affected in the same house in Russia with this disease; it does not spread the same as it does here.

3316. You state that the disease in Esthonia only kills one out of 50 beasts?—It does not take any more. I have known 100 in a house where only one died.

3317. And you still believe that that is the Rinderpest?—I do.

3318. Are you not aware that in Russia the mortality amongst the Russian cattle which are not steppe cattle is fully from 75 to 85 per cent.?—No, I am not aware of that.

3319. So it has been stated in evidence; and that of the steppe cattle 50 per cent. die with the Rinderpest, and you still believe that the Esthonian disease which only kills one beast out of 50 was the Rinderpest?—That was all that I heard of it killing; namely, one of a house where there were 100; and a gentleman showed me a beast that he had put in instead of it, and it was one of the largest that he had.

3320. You think that a disease with such a slight mortality is the Rinderpest which is now raging in this country?—Yes, I believe so.

3321. Were the whole of the cattle that you brought to London sold on the 1st of June in the Metropolitan Market?—Yes; 175, apparently.

3322. You never heard of them coming again to the market?—I did not hear of it; they might have come for all I know, because there is such scheming with some salesmen that I cannot tell. I saw Mr. Baker picking out 20 to go to Gosport without telling me. They should have been sold in open market.

3323. You stated, did you not, that that sick beast to which you have referred went to London?—I am certain of it, for I saw it on the stand, and Mr. Hönck said that he would like to keep it for grass, it being a fine ox, four years old, but I said, "Do not attempt it, "for that is the beast that has been sick."

3324. Did you not see the veterinary surgeons, Mr. Lockwood and Mr. Freeman, upon the quay, when you arrived at Hull?—I do not know them.

3325. But is it likely that two veterinary surgeons would be inspecting beasts upon their landing, and you not have observed it?—They might have been inspecting, as far as merely looking at them cursorily, but not to touch them or meddle with them, or handle them about. I should have remarked them at once if they were inspecting them and looking closely after them, because my business in landing was to make the men take off their head ropes, because they were new strong Russian head ropes, and they would have injured the oxen.

3326. Would you be surprised to learn that the Custom House authorities reported that the cattle and sheep brought by "the Tonning" from Revel were carefully examined by two veterinary surgeons, who certified that they were free from infectious disease, and fit for delivery?—That is quite incorrect, because if they had carefully examined them they would have stopped this beast, and if they were examining the oxen I had my eyes about me to see what they were doing, and they could not have been

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examined without my seeing them, because it was a most important part of my business to see that they did not cast any without due cause, and of course if they carefully examined them or examined them at all they must have stopped this beast.

3327. Was there much foot and mouth disease amongst the cattle ?—Not at all.

3328. Why did you go to Hull ?—The captain had orders to do so. My partners in London had the whole direction of the matter, and they were the owners of the steamship as well. I may mention that there was one sheep sick on board, and that sheep had to be carried on shore, and if the inspectors had examined it they should have mentioned it.

3329. (*Dr. Jones.*) Did the four oxen which you sold at Revel, because they were sick, come from St. Petersburg ; were they all St. Petersburg oxen ? —They were not all St. Petersburg oxen ; but I could not tell you where they came from.

3330. I mean the one which you think had the Rinderpest ?—Yes; I think that that was a St. Petersburg ox, but I am not sure.

3331. You told us, I think, that you thought two had the Rinderpest ?—Yes ; two.

3332. Are the Commissioners to understand that it was one or two ?—Yes ; two of the four that I sold had the Rinderpest.

3333. The two that you think had the Rinderpest were amongst the other cattle, were they not ?—Yes, they were.

3334. You said that the animal that was ill laid down, and did not chew the cud. Was there anything else that you saw ?—Running from the eyes and from the nose, and when he was standing up he would stand rather bent.

3335. Was the breath quiet ?—I do not know about that, for I did not go so close as to examine that.

3336. Did you inform Mr. Hönck and your partners at the time the animals came from St. Petersburg that they were not all Esthonian cattle ?—Yes.

3337. How did you inform them ?—I told them that they brought me in a lot. This Mr. Gerard, the consul at Revel, was Mr. Hönck's agent and my agent, at $2\frac{1}{2}$ per cent. on all money laid out ; and he wrote to Mr. Hönck, complaining that I would not take those 46 beasts that came from St. Petersburg. Mr. Honck said to me, "What is the cause, and what "about those 46 beasts ?" I said to him, "They "came in four-horse waggons, and in tying them, "and putting them in and out, they injured their "backs and hips, and one thing and the other, and "they were not fit for me to take."

3338. He was aware that you refused those 46 animals ?—13 out of 46 I took.

3339. Was he aware that you took 13 out of the 46 ?—Yes. The secretary of the agricultural society was by, and they gave some money to my man to untie the oxen, and slip them in again round where they were, and so I told the man that it was all nonsense, and made him walk them out deliberately before the secretary, to show that they were unable to walk ; they were so much injured that I could not take them.

3340. (*Dr. Jones.*) Will you inform the Commission what it was that first attracted your attention to the one which was taken ill on the 28th of May ?—His lying down, and refusing his hay and water, and not eating or chewing his cud.

3341. Was there any difference between his illness and that of the one which you sold the day before you left Revel ; was there any difference in the appearance of the animal ?—No difference, except that the one which I sold at Revel was in a much better condition.

3342. Which was the worst ?—This one that I brought here was the most ill decidedly.

3343. But this one recovered so that he came to London ?—Yes ; he came to London, and was sold in the market.

3344. (*Professor Spooner.*) I think you said that instructions were sent to the captain of the ship for him to land those animals at Lowestoft, with a view to avoiding the doctors ?—Mr. Hönck wrote to me, stating, "I have ordered the things to come to Lowestoft, where we shall run no risk of the doctor."

3345. Was any previous communication made by you to Mr. Hönck, leading him to suppose that those animals were diseased animals, and that they might possibly be stopped by the doctors ?—None whatever from me ; but I had sent him newspapers.

3346. Did those newspapers contain anything about that ?—I believe one of them did contain something about the steppe disease at the time, and that the cattle were selling cheaper on account of it.

3347. And you think that possibly from that information Mr. Hönck was induced to write to you, to say that they should be landed at Lowestoft ?—I cannot say what was the cause of it, but his letters state that. I have shown them to Professor Simonds, and if the Commissioners wish to see those letters and documents they can do so.

3348. (*Chairman.*) I think it is desirable that you should produce those letters before the Commission ; have you any objection to do so ?—Not the slightest. I will send the whole of the papers to the Commissioners.

3349. (*Dr. Playfair.*) You are aware that the Esthonian Society deny altogether the existence of disease in that part of the country ?—Yes.

The witness withdrew.

Mr. Alderman Phillips, Mr. R. L. Hunt, and Mr. W. Hanman examined.

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3350. (*Chairman.*) (*To Mr. Alderman Phillips.*) I believe you are Chairman of the Market and Fair Committee of Birmingham ?—I am.

3351. Have there been any cases of the Cattle Plague in Birmingham ?—I am not aware, with one exception, and that is some weeks ago, of any introduction of the Cattle Plague into Birmingham ; that was a calf which was bought in the market and taken away, I think, into the neighbourhood of Hampton-in-Arden, and there two beasts were infected, and the calf died and the two beasts died.

3352. Is that the only case that has come under your knowledge ?—Yes ; that is the only case that has come under my knowledge. I believe there has been another case, but that Mr. Hunt can speak to, and Mr. Hanman also.

3353. Is there much of the Cattle Plague in the neighbourhood of Birmingham ?—Not as far as my knowledge extends, but that question Mr. Hunt will answer. He has a large district to inspect, and he will tell the Commissioners the result of his experience.

3354. (*To Mr. Hanman.*) Are you the Superintendent of the Smithfield Market of Birmingham ?—Yes.

3355. Appointed by the Market Committee ?—By the Council of the Borough of Birmingham.

3356. What is your profession ?—That is my profession. I am clerk and superintendent of the market.

3357. Were you connected with any trade or profession before you were appointed to that office in the market ?—Yes ; I was in the corn trade before.

3358. Have many cases of Rinderpest come to your knowledge at Birmingham or in the neighbourhood of Birmingham ?—Not a great many ; there have been but very few.

3359. Have there been any steps taken at Birmingham to meet the case of the Rinderpest coming to the market ?—We have closed the entrance gates

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with the exception of one, and the inspector attends on the opening of the market at that gate and inspects all cattle coming in.

(*Mr. Alderman Phillips.*) Immediately on hearing of this Cattle Plague spreading over the country, I directed that the whole of the dormitories and other places for the cattle should be thoroughly lime-washed, and then I ordered that the beasts should be brought in at one gate in the market, all the others being closed, the veterinary inspector standing at the gate to inspect every animal that came in.

3360. And by that means you detected those cases to which you have alluded?—No, not a single case has been detected that I am aware of; the calf that I spoke of was taken away without its being known that it was diseased, and the other cases Mr. Hunt will tell you about; some two beasts were taken away, and I believe some serious consequences resulted; that was as much as six weeks ago.

3361. (*To Mr. Hanman.*) Can you state the circumstances of the case to which Mr. Alderman Phillips has alluded?—The calf came into the market on the 7th of September; it was taken home, and on the following day it was seen to be sickly; it refused to take its food, and it gradually grew worse till the 14th, and then died. On the 16th two cows upon the same farm were taken ill, the inspector of the district was called in, and he saw them, and he declared that they were both suffering from Rinderpest, and the beasts were at once destroyed and buried.

3362. Where was it that those animals were taken ill and died?—At Hampton-in-Arden, eight miles from Birmingham.

3363. Do you know where the calf caught the disease?—I do not; we have not been able to trace it, but we have every reason to believe that it came from the neighbourhood where some Dutch beasts had been. We have no positive evidence on that point though we have every reason to believe so.

3364. Are all the animals coming to the market at Birmingham inspected by you?—By the veterinary surgeon, Mr. Hunt, or his partner Mr. Parker.

3365. What is the number of cattle that come to your market ordinarily?—Last year we received 25,000 head of beasts during the whole year. We have two markets in the week, Tuesdays and Thursdays.

3366. Is the market principally for store beasts or for fat beasts?—There are very few store beasts in our market; until three years ago we received large quantities of store beasts, since then the store trade is falling off very much; the farmers will not buy them, and the dealers do not bring them. I may say that not more than 20 or 30 head of store beast stock in a day are to be seen in our market.

3367. Then the stopping up of the store markets in the kingdom would have very little effect on Birmingham?—Very little indeed.

3368. Could you describe how the trade in fat stock is carried on in Birmingham?—We receive large supplies from London and large supplies from Liverpool, and the rest are made up from local markets and fairs; we get very few brought in direct by farmers; they are brought in by dealers.

3369. Do the London dealers buy the animals in the Metropolitan Market and send them down alive to Birmingham?—We have dealers who come to London from Birmingham and buy them alive on the Monday market and take them down on the Monday evening, and they are exposed for sale in our market on the Tuesday, and they are sold alive. Lately we have been receiving a great many foreign beasts.

3370. Taking the home beasts first, what becomes of them after they are sold in the Birmingham market?—They are distributed through the town and the surrounding district 10 or 12 miles round through South Staffordshire and the mining districts there; a large number go into that district.

3371. They are bought by butchers, and taken away alive from Birmingham?—Yes; and slaughtered for their own purposes two or three days following.

3372. You are aware, are you not, of what is called the Consolidated Order in Council which, with regard to the Metropolitan Market, restricts the cattle which are sent there to those that are sent for the purpose of slaughter?—Yes.

3373. Cattle are imported now into the Metropolitan Market?—Yes, I believe they are.

3374. And those cattle come down to Birmingham?—Yes, I believe they do.

3375. If, therefore, they were in contact with animals infected with the disease in London, they would communicate the disease to any animals standing near them in Birmingham?—No doubt of it.

3376. Have you considered a suggestion which we have had made to several witnesses here as to restricting all movement of cattle throughout England, that is to say, having all cattle slaughtered at the place where they are grazed, and only having in towns a dead-meat market?—I have not considered it.

3377. What do you think would be the effect of such a regulation?—It would be a great inconvenience to the inlying districts. I do not know how we should get a supply for the whole of our district, if our markets were stopped.

3378. Do you think that the farmers in the neighbourhood would not be able to send you meat in sufficient quantities?—Decidedly not. I may say that fully three fourths of the stock that is killed for Birmingham and the surrounding district comes from long distances alive.

3379. You have spoken of foreign stock; do you get a very large number of foreign beasts at Birminghom now?—Yes, a great many Dutch beasts.

3380. Do they come direct from the port where they are landed?—They come right through from the Metropolitan Market. We have dealers who attend here weekly for the purpose of purchasing them.

3381. Supposing there were a modification of the suggestion, and that animals were sent to the market alive, but were not permitted to leave it alive, what would be the effect of that upon Birmingham?—I think that it would prevent a great quantity being brought. No man would like to run the risk of bringing stock to market, and not have the option of taking them away. The buyers would say, "Here "is a man who has got a lot of beasts; he is not "permitted to take them away, and we will bid him "only so and so," and that would very soon close the market.

Mr. Alderman Phillips.—We have not the means at Birmingham of slaughtering to any extent. We have not any public slaughter-houses. There are many private slaughter-houses, but not even sufficient of those to supply the town. Almost every butcher has a slaughter-house at the back of his shop.

Mr. Hanman. There are about 400 slaughter-houses in the borough of Birmingham.

3382. Are those slaughter-houses registered?—Yes; they are registered and licensed.

3383. Are they healthy and in a proper condition?—Yes; I may say that they are daily inspected.

Mr. Alderman Phillips.—They are under very strict supervision. There is a person appointed specially to go round and examine the slaughter-houses, and see that they are in a proper condition, and the garbage and everything of that kind is taken away at the proper time, and not allowed to be there more than 24 hours.

3384. Supposing that an order was issued by the Government that no animal should leave a town alive that came to market, would you not be able to afford greater facilities for slaughtering in Birmingham?—I think not. The neighbourhood of Birmingham is extremely populous; it is what is called the black country. There are Wolverhampton, Dudley, Walsal, and a vast population between Birmingham and those towns, and the butchers get their stock from Bir-

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mingham alive, and take it to those places and slaughter it. I do not think that we should be able to slaughter for the immense population of that neighbourhood. We have a population at Birmingham of 300,000 ; Wolverhampton has between 70,000 and 80,000; and in Bilston and in many of the smaller towns there is an immense population.

3385. Is there not a considerable market at those large towns ?—At Wolverhampton there is a very large market ; at Dudley the market is small ; Dudley, Brierley, Stourbridge, and all that part of the country is very densely populated. We have been singularly fortunate in not having this disease brought into Birmingham ; we have heard nothing of it, except in the case which occurred six weeks ago. I imagine that nearly the whole of our fat stock, coming as it does from the Metropolitan Market, has been inspected by proper persons appointed here, and then it gets a second inspection in Birmingham, so that we take pretty good care that the disease does not spread with us. An animal that was found to have it would be taken away immediately.

3386. Still, from the case that you have quoted, there are instances where the disease has been spread by having a diseased animal in your market ?—I think we have had no case of a diseased animal standing in our market.

3387. But you can imagine how readily it might happen ?—Yes, it might happen certainly ; but we take every possible precaution.

Mr. Hanman.—We also disinfect the market with chloride of lime.

3388. (*To Mr. Alderman Phillips.*) I have no doubt that you appreciate the magnitude of the calamity which has befallen the country. What precautions would you advise to be taken to stop the spread of the disorder ?—It is so large a question that I would not venture upon an answer ; it is a matter which requires great consideration.

3389. What would be your opinion as to stopping the fairs and markets ?—It would be extremely injurious to a large population such as we are surrounded by to stop the markets. We have not many fairs at Birmingham. We have only two fairs in the year, but to stop the markets would be a great calamity.

3390. There is no doubt that it would disturb trade very much; but there are some things, are there not, which you cannot find a remedy for without disturbing trade ?—I think that such a remedy as that would be worse than the disease. We have no large graziers in our neighbourhood, and we could not go away and buy a sufficient quantity of cattle for the people. We are supplied almost entirely from Ireland and the foreign beasts which we get from the Metropolitan Market. The number of beasts that we get from the neighbourhood is very small.

Mr. Hanman.—Fully 75 per cent. of all that is sold in the Birmingham market comes from outlying districts. I mean taking Ireland and taking the supplies which we get from London and Liverpool.

3391. (*To Mr. Alderman Phillips.*) With regard to foreign beasts, supposing the suggestion were carried out which has been made to us, of having a large market at the landing place, at some place on the Thames, or at other ports, and then having the animals sold and slaughtered on the spot; could you not be supplied with meat from a market such as that ?—In the winter time we could very likely be supplied in that way when arrangements were made. It would take some time to make arrangements for that purpose ; but it would very much enhance the price, and the poor people would get no meat.

3392. The question is, whether it would be practicable ?—I should hardly think it would, to supply the whole country, as we depend so much upon foreign stock. I read sometimes that there is scarcely anything but foreign stock in the Metropolitan Market, and you have London to supply as well ; and if the whole of the cattle were to be slaughtered on landing, and you had to supply the Metropolitan district as well as the country, it would require an enormous establishment to carry out a plan of that kind.

3393. (*To Mr. Hanman.*) Could you state the number of foreign cattle that come to Birmingham ? —I should say that 75 per cent. of the quantity sold are Irish and Dutch beasts, and I should say that we are getting now about 40 per cent. of foreign cattle.

3394. (*To Mr. Hunt.*) Have you any suggestion to make to the Commissioners as to the best course to be adopted for stopping the spread of this disorder ? —I am personally perfectly well satisfied with the Order in Council. At the present time we have found it work well with us, and if the order is only worked out as rigidly as it is in our neighbourhood, the thing is quite sufficient for the want.

3395. Of what district are you speaking now ?— Of Birmingham.

3396. We understand that there is very little disease in that district ?—I could mention every case that has occurred. I can tell you what cases we have in existence now, and I can also tell you that we have had four distinct and separate outbreaks in four distinct and separate spots, and in each of those cases which have come under my observation I have succeeded in quelling the disease, and it is now come down to one narrow point on one farm, where I believe that the whole of the stock will eventually die ; but it is there and there alone. We have received very ready co-operation on the part of all right-minded persons round the district. I am the inspector of five districts round that neighbourhood, including a portion of Warwickshire, Worcestershire, Shropshire, and Staffordshire, all of which just impinge upon Birmingham ; and I was placed as inspector of those districts so as to enable me to follow any dealers that might want to escape the observation of the inspector in one county and to slip out of it into the other. By the powers which I hold, and which are amply sufficient to attain the end in view, I have now accomplished that ; in three instances out of four the disease has been stopped entirely, and I have got a clean bill, with the exception of one farm.

3397. What means did you adopt ?—Simply those that were laid down by the Order in Council ; by firmly carrying out those orders. I have not been a universal destructive ; in fact I do not think I have ordered one beast to be killed. Where animals were killed with a view of preventing the disease from spreading I have seen that they were disposed of. I have seen that they have been properly killed, and the skins properly disinfected, and the bodies disposed of in the manner that was ordered. But those are the only means that I have adopted.

3398. You are probably a very competent inspector; but supposing the case of a district where there was no good inspector, what would happen then ?—I do not think we have any right to have bad inspectors. I think that there are plenty of good inspectors who can do simply what I have done, if they will only follow out the Orders in Council.

3399. Supposing we had strong evidence to show that the Orders in Council have not been sufficient, have you no remedies to suggest ?—I have nothing to suggest in the way of remedy, because I have not needed anything further.

Mr. Hanman.—No doubt a great deal of this disease has been promoted by the present system of railway traffic.

Mr. Alderman Phillips.—The filthy condition in which the railway trucks are, in which cattle are conveyed from one town to another, is almost sufficient to give disease of a very virulent character ; and we have to take into account, not only the filthy condition of the trucks, but also the length of time that cattle frequently go without having water in hot weather, crowded together as they are, so that they sometimes trample one another to death. I think there is more mischief caused by the manner in which the railway companies convey cattle from one place to another than by any other means.

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3400. (*Mr. Read.*) (*To Mr. Hunt.*) I think you stated it as your opinion that the Orders in Council are sufficient if they are properly attended to ?—Yes.

3401. Are you aware that there is an Order in Council now, that all cattle that go into the Metropolitan Market are to be sold entirely for the purpose of slaughter ?—I have heard so.

3402. Do you think it is carrying out that Order in Council that those bullocks that are sold in the Metropolitan Market should go to the Birmingham Market, be exposed there for sale, and perhaps again sent into the country ?—I should fancy that there would be an infringement of that order in the very fact of sending them from London into Birmingham. I should think that that was not what was meant by the order.

3403. You have heard Mr. Hanman state that they do go down ?—Yes, and I have seen them weekly myself.

3404. (*Dr. Playfair.*) (*To Mr. Hanman.*) If, for any temporary measure, the importation to the Birmingham market of the foreign stock and the Irish stock were prohibited, except as dead carcases, would you not have abundant slaughter-houses to slaughter the remainder ?—I think not.

3405. You would only have 25 per cent. of your cattle left. There are 75 per cent coming from the Dutch and Irish markets. Have you not sufficient accommodation in Birmingham to slaughter the remaining 25 per cent. of the cattle that come to the market ?—Yes, unquestionably we have. Yet it will be necessary to provide a much larger quantity than the 25 per cent.

Mr. Hunt.—Perhaps I may be allowed to add that all the cases of disease that have existed in our neighbourhood have been clearly traced to animals that came from the Metropolitan Market, and that has been so in every instance with the exception of the calf, and we could not find out the vendor of that calf. It was purchased in the market in the lax manner in which very many purchases are made in the market, the buyer merely looking at the animal as being worth so much money without finding out where it came from. I made a journey of inspection all round the district where the vendor of this calf was supposed to live, but I could not trace it to him, and I was unable to find out where the animal obtained its disease from ; but in all other instances that we have had I have been able clearly to trace them to animals from the Metropolitan Market, and, in all cases but one, to foreign animals, but that exceptional case was a Hereford beast which had been exposed for sale with foreign beasts in the Metropolitan Market before coming down to Birmingham. I am giving the Commission now the result of my experience as veterinary inspector of the district, and not of the Birmingham market alone. My experience of the disease in the Birmingham market has been very limited. I have never yet had to reject a beast that has been exposed for sale in the Birmingham market, and there have been only two instances that we could trace of its ever having existed in that market.

3406. (*Chairman.*) You are aware that there is considerable difficulty in detecting the disease in its early stages ?—Yes.

3407. And it is therefore quite likely that an infected animal coming from the Metropolitan Market might be exposed for sale in the Birmingham market without your being able to detect the disease ?—Yes, and capable of disseminating the disease while in that state.

3408. (*To Mr. Hanman.*) Is there a large dead-meat market in Birmingham ?—There is.

3409. Where does that meat come from ?—It is principally killed by the carcase butchers in the borough, the animals being purchased in the market, and taken to their slaughter-houses, and then taken to the dead-meat market.

3410. Is dead meat sent from London or Scotland to be sold at Birmingham ?—No.

3411. They are all slaughtered in Birmingham ?—Yes, they are all slaughtered in Birmingham.

3412. (*Mr. Read.*) (*To Mr. Hunt.*) As you are such a distinguished member of the veterinary profession, I should like to ask your opinion about fairs and markets for store stock ; do you not think that it would be very necessary to suppress them ?—That is my opinion, decidedly.

3413. (*Chairman.*) You would not extend that to fat stock ?—It is too large a subject almost for me to grasp, but I do not think I should extend it to fat stock.

3414. Do you not believe that there is danger from having a fat-stock market ?—There is danger wherever there is a large congregation of beasts.

3415. You refer to the danger arising from a diseased animal sold to a butcher being taken to another part of the country remaining alive some days before he is killed, and communicating the disease to its neighbours ?—Yes, no doubt. I have known cases in point.

3416. (*Mr. Read.*) Would not that danger be very much mitigated if all the cattle that entered the fat-stock market were not allowed to leave the town alive ?—No doubt.

3417. Would there be much danger then, do you think, of the propagation of the disease from that fat-cattle market ?—There would be little or none, because it is cattle going into the country that produces the disease. In fact, the retention of the beasts in the town would be little or none, for those beasts would be in close places where other beasts would not come to them.

3418. (*To Mr. Alderman Phillips.*) In many cases that have come before us, that plan might be possible, but you do not think it would be so in the town of Birmingham ?—No. Many cattle are purchased and are sent to a butcher who has ground in the neighbourhood, and he sends his cattle out to graze in the summer time, or he buys cattle that he wants the next week or the week after ; and those cattle are sent out into the fields.

3419. (*To Mr. Hunt.*) Will you state to us what appointments you hold ?—I am a veterinary surgeon, and a member of the Council of the Royal College of Veterinary Surgeons, and assistant veterinary inspector to the Royal Agricultural Society of England. I am appointed cattle inspector to the district of Birmingham, and I hold four other appointments besides that at Birmingham. I am veterinary inspector to four petty sessional divisions surrounding Birmingham, besides the borough.

3420. (*Chairman.*) (*To Mr. Alderman Phillips.*) Have you anything further to suggest which you think would be valuable to the Commissioners ?—No ; we came here to give any information that we might possess, but we have not prepared ourselves to offer any suggestions.

The witnesses withdrew.

J. Clayden, Esq.

JOHN CLAYDEN Esq. examined.

3421. (*Chairman.*) You are, I believe, chairman to the Agricultural Hall Company ?—I am.

3422. Are you in any other way connected with the cattle trade ?—I farm about 1,800 acres of land ; 1,000 under Lord Braybrooke, and nearly 800 of my own. I am mayor of the borough of Saffron Walden in Essex ; and we have shut up the Saffron Walden market for six weeks last Saturday, also the fair on the first day of November next.

3423. Will you give the Commission the benefit of your evidence as to what you consider to be the best measures to stop the spread of the Cattle Plague? —My wish would be that every head of cattle should be confined to the spot where it now is, for at least

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one month. The disease is of the most virulent and most contagious character, and it requires the most active measures to counteract it, and this season of the year is the best that could be adopted for that purpose. Meat will keep good for a long time, and the means of conveyance in the country are exceedingly good, and there is no frost to affect the quality of the meat. There are very few farmyards in which a shed could not be soon formed for a slaughter-house. I do not mean to say that it would be as good as a butcher's slaughter-house, but it could be formed; and if you could confine the disease to the place where it now exists, for one month, which would entail the slaughtering of all foreign cattle near the port of disembarkation, it would have a very beneficial effect. I should have in my pocket a book written by Mr. Webber, which I think your Lordship has had sent to you. He wrote to me this morning to say that one had been sent by Sir Fitzroy Kelly. In this book he recommends the putting of all foreign cattle in quarantine for three weeks, but if I were an importer of foreign cattle I would far more readily have them killed on the spot, and slaughtered at the outports, than put in quarantine, because the quantity would keep accumulating, and the meadows near the port of disembarkation are all low and marshy, and a very bad description of meadows for cattle to lie in for three weeks, and of course would be very likely to breed the disease in cattle lying in them for that time.

3424. Will you state to the Commission why you consider those strong measures necessary?—Because of the contagious character of the disease, and the loss that it entails both to the purchaser and the seller and the consumer.

3425. If you take the case of store animals first, is it your opinion that store animals congregating together in a town acquire the disease, and that when they are sold they spread it through different parts of the country?—Yes; without doubt, and the profits of farming are now cut down so low that the graziers buying cattle for grazing cannot afford to lose a bullock; they can scarcely afford to lose his tail, and great loss is caused throughout the country through the movement of the store cattle, and the farming interest will be reduced to a most woeful state if this thing is to continue.

3426. Would it not put the breeders of those store cattle to great inconvenience from their not being able to sell them?—No doubt, and to the purchasers also. The disease is of that nature that great inconvenience must be felt, but I do not see when it could better come than now, because the country is exceedingly full of feed, and it is a time of year when cattle will not suffer. We know that there are many grazing farms where they are sold from, but still there never was such an abundance of feed as there is now.

3427. You would stop all movement of cattle?—Yes. I would confine every animal in the kingdom, England, Ireland, and Scotland, to the place where it now is for one month. And in doing that the foreigner would have no cause of complaint, because his cattle would be treated just the same as the English farmers'.

3428. Taking the home trade first, do you think that the butchers' trade could be carried on if all the animals were obliged to be slaughtered on the farms themselves?—I feel sure that it could. There is not a farm on which a slaughter-house could not be made, and it is a time of year when meat would not suffer from exposure. In the winter season the meat would be very much injured by the frost, and in hot weather by exposure to the weather, but that is not the case now.

3429. You think that the trade of the country would readily accommodate itself to this change?—Yes, I believe it would. But those are only partial measures, and would be of no use unless the system were carried out all through the country. I went before our county magistrates on Saturday upon the subject, and they have readily shut up all fairs in our division of the county, and we have shut up our market for six weeks. I also learnt from Mr. Collins to-day, that St. Ives market is shut up for store stock.

3430. You consider it important that all the markets should be shut up, and not individual markets here and there?—I do; I look upon those as partial measures which will do a certain amount of good, but they will not meet the exigency of the case, in my opinion.

3431. Supposing fairs only were stopped, do you believe that there would be a great many private sales of cattle in the country?—Yes; what is there to prevent a man taking animals into his own pasture and selling them.

3432. You think that great mischief would arise through the private sales?—Yes, decidedly; I am now buying bullocks out of Lord Braybrooke's park, which I suppose are secure, and for those I have to give 2*l.* or 2*l.* 10*s.* per head more than I should in the open market, because of fancied security.

3433. There would be a danger in those animals bought in a private way travelling about the country?—There is no question about it. There is great fear just now in removing any animals.

3434. With regard to foreign stock what have you to say?—Nothing; I have the honour of being chairman of a Cattle Plague association in our neighbourhood, and we all feel that it was imported by foreign animals and given to the London cows. We have only had two cases in our district, and they both arose from calves bought from the London dairies. In consequence of our having an association, and insisting upon every animal being killed, we have not had a single case of the disease spreading in our district. In the two cases in which the disease originated, every animal was slaughtered on the farms, and it did not spread, either in the district or in the individual parishes.

3435. With regard to the foreign cattle that come to market, and which are very important for our consumption, how would you deal with them?—I would slaughter them at the port of disembarkation. I would place them on the same footing as English cattle, and you would use the foreign importer more fairly by slaughtering his cattle than you would by putting them in quarantine. Just picture a lot of cattle taken out of the hold of a vessel and put on to a marshy meadow, and having to be there for three weeks; that is more likely to bring the disease than to prevent it.

3436. You are strongly against quarantine, and you believe that it is practicable to kill the animals on shore when they land?—I think so. I am of opinion, as I wrote to Mr. Read, that that is the only plan that could be adopted to save the cattle of the kingdom.

3437. (*Mr. Read.*) Are you not aware that in this next month we require something like 20,000 store stock in Norfolk?—I am perfectly aware of that, and that is the greater reason why the traffic should be stopped. You cannot bring a stronger reason than that, for by the movement of those store stock you will be importing the disease.

3438. Then you would have the stock that are in the grass lands now starved, and our turnips might rot in the mean time?—You must do the best you can with your turnips, and you had better have your turnips rot than have your beasts die; but I do not think that starvation would follow, because I think there is such an abundance of grass and feed this year that if ever there was a season when this plan could be adopted this is that very year.

3439. What would be the harm of allowing the Metropolitan Market to be open, provided that all stock that went in there alive should not leave London?—That would do very great injustice to the sender of cattle. You would be putting the whole trade of England into the hands of the London butchers, and I believe that if you look at the returns

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you will see that the London butchers are now taking more out of this cattle disease than any other class of men living. I am acquainted with several of them, and I tell them so plainly, also the salesmen.

3440. Would there be any objection to having half-a-dozen large fat-markets in London and in different parts of the kingdom ?—I would not have one.

3441. I believe that you are a member of the Council of the Royal Agricultural Society ?—I am.

3442. And that you are also a member of the Council of the Smithfield Club ?—Yes, I am.

3443. So that we may consider you a great agricultural authority ?—I had not thought about coming here to give evidence, but my opinions are very strong indeed.

3444. (*Chairman.*) Would a farmer lose a great deal of money by having to kill his animals on his farm instead of sending them to market ?—I should imagine that he would incur a loss, but it would be nothing in proportion to the loss which is now sustained.

3445. Would he get a market for the different things that he would have on his farm, the offal and so on ?—No; I should imagine that the beasts would be bought by the butcher, who would take all those things and disinfect the skins on the spot. A butcher would come down and buy 20 beasts or more, and he would say, "I will take those beasts, and I shall send "a man down to kill them, and send them away by "railway." I suppose that the butchers would take everything, telling the man in the country that they would buy a lot of good cattle, and take all the risk. I should imagine the bargain would be generally, that the offal should be taken, and the farmer would receive no benefit, but rather loss, because the dealers would take advantage of there being no other market.

3446. (*Mr. Read.*) You think that the inconvenience would principally fall upon the butcher, rather than upon the farmer ?—There would be inconvenience to all parties; but nothing serious to raise a great complaint about. The trade of the country would accommodate itself to it.

3447. Would you extend your prohibition to the movement of sheep as well as cattle ?—Yes, I should. In our neighbourhood, last Saturday three weeks, a man named Giblin of Wethersfield, near Braintree, bought 80 sheep at Colchester market of a man named Johnstone, and on the Monday following they arrived home; 5 died immediately, and they kept dying till Professor Simonds was sent for. Other veterinarians were had recourse to, but they said that it was not the Cattle Plague. Professor Simonds then reduced the lot down to 54, and the other 26 he slaughtered as good for human food. They all died, and they died within 18 days of being purchased.

3448. Were they lambs ?—No; they were wether sheep—shearling sheep. That has made us afraid of this disease; and to prove that this was the disease a man named Raven, whose fields adjoin Giblin's, and where there was a brook not so wide as this table between the fields, had two cows, one of which took the disease and died, and the other he had killed; and another farmer in the same parish had the disease also from those sheep as it was supposed, as the fields adjoined.

3449. Would you attribute that disease to anything but the sheep?—Certainly not; it had not been in the parish before those sheep arrived there. We did not think so much about the sheep until this case happened, which frightened all the people very much.

3450. Have there been any other cases of the plague at Colchester market ?—I feel quite sure that there have been many; but it is a long way from me, 33 miles, and I do not often go.

3451. (*Chairman.*) Have you any other suggestion to make which you think would be valuable to the Commission?—Nothing else. It is a most contagious and dangerous complaint, and I think that strong measures must be used sooner or later.

The witness withdrew.

Adjourned to to-morrow at 12 o'clock.

Wednesday, 18th October 1865.

PRESENT:

Earl Spencer.	Dr. Parkes.
Viscount Cranborne.	Mr. M'Clean.
Dr. Lyon Playfair.	Mr. Wormald.
Mr. Read.	Mr. Ceely.
Dr. Bence Jones.	Professor Spooner.
Dr. Quain.	

EARL SPENCER IN THE CHAIR.

Mr. N.J. Lockwood.

Mr. Noel James Lockwood examined.

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3452. (*Chairman.*) You are a veterinary surgeon employed by the Commissioners of Customs as inspector of foreign cattle at the port of Hull ?—I am.

3453. Will you state the ordinary method which you adopt for inspecting foreign cargoes which arrive at Hull ?—When the packets come into the roads, if they can get alongside the pier they do, whether night or day. They immediately send word to me or my partner, whosoever's turn it is, that they are about to land. We immediately go down, and the cattle are discharged. They are tied to a rail until we re-examine them, and they they are allowed to go.

3454. How do you re-examine them ?—We examine them when they come off at the gangway, and then when they are untied we examine them again.

3455. Was the examination sufficiently strict before this Rinderpest broke out for you to detect any serious illness ?—I do not think that it was.

3456. But since the Rinderpest has broken out you have made some alteration in the system ?—We have; we used not to examine them twice, but we do now, and when they are put into the portion of our market which is for foreign and Irish cattle we very often examine them, but not always.

3457. Does a very large number of foreign cattle arrive now at Hull ?—A great number.

3458. Can you state the numbers ?—Yes. This is a return for the last quarter.

The witness delivered in the same, which is as follows:

"Port of Hull.

"An Account of the Number of Cattle imported into this Port during the Quarter ended 30th Sept. 1865.

—	Bulls.	Oxen.	Cows.	Calves.	Sheep.	Lambs.	Swine.
	450	3,676	8,109	4,002	19,137	1,015	6,486
Detained -	—	—	107	3	2	1	15
Destroyed -	1	—	5	3	15	—	23
Total imported	451	3,676	8,221	4,008	19,154	1,016	6,524

"Respectfully submitted,
"W. F. Bean, Examiner."

3459. Do you remember a vessel called the "Tonning" arriving at Hull from Revel ?—I do.

3460. Can you state the date of the arrival of the "Tonning ?"—I cannot.

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3461. Do you remember the particulars of the arrival of the "Tonning"?—I do.

3462. Will you state what occurred?—When the Customs found that there were a great number of cattle coming from Revel, they ordered both of us to be there to examine those cattle, and we did examine them thoroughly, and I think that I never saw in my life beasts come up in a fresher state than they did.

3463. You had a special order from the Customs intimating that a certain cargo was coming from Revel, and directing you to pay special attention to it?—Yes; and both of the inspectors were there. The beasts went through each of our hands.

3464. Have you any objection to put in that order?—Not the slightest.*

3465. Were any of these animals sick?—They were not; they were on the passage six days. They were not all fat beasts, but they were in very fine condition; that is to say, fresh and healthy.

3466. Did you examine them first as they came over the gangway, and then did you examine them after they were tied up at the posts?—No. The other inspector examined them, I believe, first, and I examined them afterwards, as they came up the slope on landing. He was at the bottom of the slope and I was at the top.

3467. What time of day was it?—I forget, but I know that it was daylight; it was in the morning, I believe.

3468. Do you make merely a cursory examination of the animals, or do you stop them, and open their mouths?—We stop them, and we order the men who lead them up to open their mouths; not every one, but a great number.

3469. Did you examine these animals in that way?—Yes.

3470. You do not know what became of these animals?—No.

3471. (*Dr. Parkes.*) Was there any difference in any of the cattle which appeared to have come from a different part of the country?—No; they were all as fresh as possible.

3472. I think you said that there are a foreign cattle market and a home cattle market at Hull?—Yes.

3473. Has any objection ever been raised to that course of separating the two?—No, I believe not. A new market was formed, and the corporation of Hull thought that it would be better to separate the foreign from the English cattle.

3474. When was that done?—About 12 months ago; they are all in the same ground, but are separated by a wall.

3475. The dealers have never raised an objection to that practice?—Not the slightest.

3476. (*Mr. Read.*) Is it usual for you to receive orders from the Custom House authorities with regard to particular cargoes?—No.

3477. Why was this order issued?—I do not know, except it was because of the quantity; we have not had such a quantity for a long time. I know that it was a very large cargo; and that is the reason why Mr. Pretty, our surveyor, said that we had better both of us be down.

3478. How long are you inspecting these foreign cargoes?—Sometimes four or five hours.

3479. How long were you inspecting this Revel cargo?—I think about three and a half hours, as nearly as possible. It was a cattle boat, and therefore they got off quicker than the ordinary boats in Hull. They generally hoist them by slips; but now they have a new way of forming gangways at the wharf, from one hold to the other.

3480. There were 321 cattle, and you say that you were about three and a half hours inspecting them?—Yes.

3481. That is pretty well two a minute. Could you mouth all these beasts in that time?—No; we do not mouth every beast that comes.

3482. You do not mouth any, do you?—Yes.

3483. Why?—If we are at all suspicious, and see any running of the eyes or a little extra breathing, or if the beast looks dull, we always have the mouth open.

3484. Of course you are well acquainted with the cattle trade. What do you suppose to have been the value of these cattle, as you say they were such good ones?—On the average, I should think about 12*l.* from Revel.

3485. Were they very small?—No; they were all good sized beasts; some were better than others.

3486. They could not be in a very good condition to be worth only 12*l.* each?—Yes; they were in very nice condition; they had been watered and well fed on the passage. That boat was expressly chartered for those cattle.

3487. If you had express orders from the Custom House authorities to take special care in the inspection of these cattle, why did you not tie them up, and look at them as you do now?—We thought that having two of us we could certainly detect anything amiss by both being on duty instead of only one; if only one of us had been on duty that one would, perhaps, have tied them up.

3488. What did you do with the sheep?—They were turned on their backs.

3489. All of them?—Perhaps not all, but say two out of three.†

3490. How many sheep were there?—I cannot say.

3491. Were there not something like 300?—I do not know that there were so many.

3492. The inspection of the cattle and sheep lasted about three and a half hours?—Yes.

3493. And you turned every two out of three sheep on their backs?—Yes.

3494. Am I to understand you to say that the whole inspection of these 600 animals lasted only three and a half hours?—Yes. There were two of us doing it; it would have lasted longer if there had been only a single inspector.

3495. Several of the cattle were mouthed?—Yes.

3496. And the majority of the sheep were turned on their backs?—Yes.

3497. Did you observe that there was one sheep which could not walk?—Yes; or two.

3498. What was the matter with them?—They seemed to have been lain upon and half suffocated.

3499. Do you think from that inspection that you would have been able to detect any disease?—I certainly say not.

3500. (*Mr. M'Clean.*) From the return which you have delivered in it appears that during the quarter upwards of 16,000 head of cattle were imported into Hull, and that 9 were destroyed?—Yes.

3501. Why were those nine destroyed?—Because they were found dead.

3501. And not from any plague?—No; not from any infectious disease.

3503. Have you seen the plague in any foreign cattle?—I have not.

3504. (*Mr. Read.*) Have you seen it in any English cattle?—No. We are quite clear where I come from; we have not a single case in Hull. I am inspector for about 20 or 30 miles. I have been called to see two or three cases, but they have been cases of pleuro-pneumonia.

3505. (*Chairman.*) Did you enter into conversation with Mr. Burchell who was on board the "Tonning" when she arrived?—No.

3506. Did you see him?—I saw a party who ordered different people about; and at last he was ordered off the ship altogether, by Mr. Twidell, the shipping clerk of the firm of Brownlow and Lumsden.

3507. Who received the cattle when they were landed?—Messrs. Brownlow and Lumsden. It appears that there had been a quarrel between the

* The witness subsequently stated that "no special order" with regard to the "Tonning" had been issued from the Customs, as the two inspectors were in attendance on similar cargoes both before and after the arrival of that vessel.

† This was subsequently altered to "two out of five."

party who went out to buy the cattle and the party who paid the money.

3508. Then Mr. Burchell had nothing to do with them when they were landed?—He was ordered off the ship. The owner of the cattle came to say to the shipping clerk that he had discharged him from his service, and that he had nothing to do with the cattle.

3509. Do you know who was that owner?—I do not remember.

3510. (*Dr. Playfair.*) Was Burchell's discharge immediately upon the cattle arriving?—Yes; he came down on purpose to discharge this man, and he discharged him; at least the shipping clerk told him to leave the ship altogether.

3511. Then he was not there during the three hours that you were examining the cattle?—He was looking about on the pier.

3512. Do you think that he must have seen you?—Yes; he must have done so, because we handled every beast, but we did not open the mouth of every one.

3513. Would you be surprized if he had stated in evidence that he saw no inspectors whatever looking upon the cattle?—I have heard that in the Custom House. We have letters from different parties in the Custom House. There were two of us; one at the bottom of the gangway and one at the top, and every beast that passed was got hold of, first by one of us and then by the other. In the first place, if we are not there the Custom House officers will not allow cattle to be landed. If we should be called away for any time, they would stop the cattle.

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3514. Did you ask what had been the health of the cattle on board?—Yes.

3515. And what was the reply?—That they had been very healthy.

3516. Did you find that one had been sick during the passage?—No.

3517. Whom did you ask?—I asked nobody; I heard it in conversation; I heard Mr. Twidell, the shipping clerk, ask them how the cattle had been, and they said that nothing could have been better.

3518. (*Mr. Read.*) And if there had been one ill it would have been no uncommon occurrence?—No; a great number are often ill, especially when they are brought out of the hold.

3519. (*Chairman.*) Who had charge of the cattle on board?—Nobody; excepting that this man had charge previously to his getting to Hull, and then the owner of the cattle came down, and told the shipping clerk to Messrs. Brownlow and Lumsden that he must not allow this man to do anything with the beasts, as he had turned him off; and Mr. Twidell, the shipping clerk, turned him off on board.

3520. Did you see this man who you believed to be the owner of the cattle?—No; but I saw his man.

3521. You do not know the name of his man?—No.

The witness withdrew.

Mr. William Shipley examined.

Mr. W. Shipley.

3522. (*Mr. Read.*) Are you inspector of the imports of cattle at Lowestoft?—Yes; I have inspected them lately; within the last three years.

3523. How much do you receive per cargo for inspecting cattle, or how are you paid?—I cannot exactly tell you, because I am nine miles from Lowestoft, and it entirely depends upon the time that I have been detained there. We have no ships in there now, excepting they come in under bad weather, and so on; and we have had some long cases. I think that we had 608 beasts, and 300 of them died, so that it made several days' work.

3524. When was that?—In 1863. I am hardly called in, except under similar circumstances to that, because the beasts generally go on to Harwich.

3525. Is there any other inspector at Lowestoft besides yourself?—No.

3526. You say that the import trade of Lowestoft is almost annihilated from some cause or another?—It is.

3527. Why?—I cannot tell why. I have a list of what I have had. In 1863, there were the "City of Norwich" and the "Tonning" with 608 beasts and 800 sheep. There were 300 beasts dead or slaughtered, and 230 sheep dead or slaughtered. On November the 4th, there was the "Roland" from Hamburgh with 15 beasts and 12 horses. There were 10 bullocks and eight horses dead. On the 2d of December the "Norfolk" put in in bad weather, with 80 cows, 90 calves, and 170 sheep. In 1864 there were three small Dutch vessels which put in with 72 beasts. In 1865 there were 20 beasts in Lowestoft. Those are all the beasts that I have ever inspected.

3528. What is the date of the last import?—January the 1st.

3529. A great number of sheep and cattle appear to have died; did they die from disease, or were they killed?—They died from exhaustion consequent on the long voyage.

3530. They were injured by a tempestuous voyage?—Yes; they broke lose, and became smothered, they trampled on each other.

3531. Are you inspector of any district in Norfolk?—Yes; East and West Flegg, and Great Yarmouth.

3532. What has been the progress of the disease there lately?—The progress of the disease is much about the same, I think, as it has been for two months past.

3533. How many fresh cases have you had within the last fortnight?—On October the 1st I had a case, and seven animals were slaughtered. On the 6th I had two cases, and they have recovered. On the 12th I had a case which died. And on the 13th I had a case which was shot.

3534. Those are all in one neighbourhood?—Yes; within six or seven miles.

3535. Has the general health of the cattle which have been imported at Lowestoft been good or bad?—It has been very good. There has been no disease at all of any sort.

3536. With the exception of these sad accidents they have been imported in very good order as well as in good health?—Yes.

The witness withdrew.

Charles Stevenson, Esq. examined.

C. Stevenson, Esq.

3537. (*Chairman.*) I believe that you are the Editor of the North British Agriculturist newspaper?—Yes.

3538. Have you considered a good deal the subject of the Rinderpest in England?—I have.

3539. Do you consider that it is of a very serious nature, and likely to be a great calamity in the country?—I think it will be very difficult to get it subdued, and perhaps very difficult to get the country quit of it.

3540. Do you consider that the measures which have been already taken by the Government are sufficient to meet the evil?—In some degree they are, but I think that they have not been generally applied as regards

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Scotland, for there are almost no steps taken, no person having been fined for infringing the Orders in Council.

3541. What suggestions would you make towards putting an end to this disorder in Great Britain ?—I would suggest that an order might be framed of which the provisions should perhaps be not so very stringent as the present orders, and that the magistrates might have the power of taking further measures under a new Order in Council.

3542. Do you consider that the inspectors now have too large powers of slaughtering animals ?—Yes; I decidedly object to slaughtering any animal except for the purpose of making use of the carcase for food, unless the owner wishes it to be slaughtered. I consider the meat perfectly wholesome in almost any case of Rinderpest.

3543. Have you formed any opinion on the recent Order in Council which enables magistrates in petty sessions or the magistrates of boroughs to forbid all fairs and markets ?—Yes ; I have looked carefully at it, for the magistrates in Edinburgh have had some difficulty as regards a market held beyond their boundaries, what is called Hallow Fair. They have taken the opinion of counsel upon the subject to ascertain their powers of stopping that market.

3544. Do you consider it a desirable measure generally that fairs and markets should be stopped throughout England and Scotland ?—All store markets, decidedly ; and I maintain that all lean cattle taken to a fat-cattle market should not be allowed to leave the market, or that a circle should be prescribed by the magistrates so that from any parks or lairs near a town the animals should not be removed, and that they should be slaughtered within at least ten days from being taken to the market.

3545. You would allow the animals to remain alive for ten days within a certain district permitted for that purpose ?—Yes, and sheep also ; I likewise consider that sheep and pigs should come in the same category.

3546. What proof would you require to show that these animals had been slaughtered within the 10 days, and had not been removed into various parts of the country ?—The slaughter-house returns might show that. In the event of those persons infringing the order they are liable to be fined.

3547. Do you believe that it would be possible, under such circumstances, to allow the existence of of private slaughter-houses ? — I am decidedly against private slaughter-houses. I have been through several in Smithfield some years ago ; and such scenes I never witnessed, or could suppose to have been committed in any civilized nation ; cattle were standing side by side, and men were busy in slaughtering them ; there were something like perhaps 100 cattle in one of these places on the evening I refer to.

3548. With a view to get those orders properly carried out, would it be possible to allow private slaughter-houses to continue ?—In the country districts I do not see that these can be prevented. In a small town a flesher has a place of his own, and I do not see that you can interfere, where there is no public slaughter-house.

3549. (*Mr. Read.*) A flesher is a butcher ?—Yes.

3550. (*Chairman.*) Then your view is that all lean markets should be stopped, but that under certain retrictions fat markets should be allowed ?—Certainly.

3551. Your remark would apply to foreign cattle as well as to home cattle ?—Yes.

3552. There have been various suggestions made by witnesses to the Commission. Without giving an opinion upon them, I will ask you what you think of them. A suggestion has been given to the effect that it would be desirable to stop all movement of cattle in Great Britain altogether, and that animals should be slaughtered at the place where they are reared or grazed. Do you believe that that would be possible ?—I do not think that it would be possible without creating a very great amount of dissatisfaction, which would bring such a pressure to bear upon the Government that they would be obliged to rescind the order.

3553. Is there great deal of trade now in dead meat from Scotland to England ?—A very great deal, generally in the winter months. I have not the statistics of it from Edinburgh and Aberdeen as I expected, but it is very large.

3554. Do you consider that that trade could be developed with advantage ?—With very great advantage to consumers as much as to feeders.

3555. Can you state shortly your reasons for that opinion ?—During the cool season the meat arrives in London in better condition than if the beast had been slaughtered in London. The fleshers find that it frequently brings a higher return to send up the best portions, and to dispose of the offal in Aberdeen or Edinburgh. All the best parts of the carcase are sent to London, where they realize a higher price, and the consignees receive more money, than they would do by selling the carcase and the offal in Edinburgh or in Aberdeen.

3556. Do you think that there would be difficulties in extending that system to all parts of the kingdom ?—There is this difficulty, that meat arriving in Edinburgh or in Glasgow in a basket is usually considered to be the carcase of an animal which has been slaughtered to prevent its dying, and it is looked upon with great suspicion ; whereas in London so much of this trade is carried on that carcases coming direct from Scotland sometimes sell in the west end of London at higher prices than if the beasts were killed in London.

3557. But that is a prejudice which would be easily destroyed if they were obliged to adopt that course ?—In time I believe it would, but not for some time. If you will allow me, I will call your attention to one thing upon which the magistrates of Edinburgh feel a difficulty, namely, private sales. hold that all these weekly, fortnightly, and monthly sales of stock, whether lean or fat, should be prevented, and also public sales of stock, which may be made known by advertisement or otherwise, such as sending circulars. I think that you might permit the sale of any stock which has been upon a farm for two or three months, provided that the disease has not shown itself upon the farm for a certain period, say two months.

3558. Do you think that the private sales are a means of disseminating the disorder as much as the public sales ?—I am certain that they have done so. I may mention that Mr. M'Combie of Tillyfour, a great feeder, has taken a very active part with a view to stop these sales. Recently, I believe, he has applied for an Order to the Privy Council to get such powers for the county of Aberdeen. He is chairman of the Cattle Disease Committee. Parties purchase lean or fat cattle, and send them to a sale. The moment they are knocked down to a purchaser, all responsibility appears to end, and the cow or ox is carried off to Glasgow, if the sale is in Edinburgh, or to some other market, and is there again disposed of.

3559. And as it is rather an object for a man when he has a diseased animal to sell it as rapidly as possible, such sales very often are those of diseased animals ?—Yes ; and he avoids the responsibility to a certain extent ; at least he believes so. He does not meet the purchaser; the agent is not responsible, nor any person who sends an animal to these sales. They are responsible of course under the Order in Council, but that has never been acted upon in Scotland. I want the Order in Council to be more explicit, so that the magistrates of Edinburgh or the magistrates of the county of Aberdeen, or any person who wants to put it in force, shall have the power of doing so, in order to prohibit all weekly or monthly sales.

3560. Do you consider that no remedy short of stopping markets, such as you describe, would effec-

tually stop the disorder in Great Britain?—I believe not. I may mention that in a letter from Mr. M'Combie he states that the disease was introduced into the county of Aberdeen by calves from London, and in four different places, and that at an expense of about 2,000*l.* they have slaughtered all the diseased animals, and he says that there has been no case of any outbreak for the last eight or ten days.

3561. Would you therefore be in favour of a system of slaughtering generally?—No. I decidedly object to slaughtering, except the owner wishes the animal slaughtered; and I think that the carcase should, if possible, be made use of for food.

3562. Do you think that the Government should take some strong sanitary police measures all over the country in order to stop all markets?—No. I would give the magistrates of a county or of a district that power. I would not give the Government the power over Great Britain and Ireland to stop all markets. I would make the local authorities responsible for such a step, which would be very unpopular in many districts.

3563. Does it not often happen that when one fair is stopped another in the neighbourhood goes on, and that the one which goes on will do more mischief than if the two were going on together?—That is very possible; but still, my object is that the local authorities should be made responsible, or be the responsible parties for any steps taken. An Order in Council might recommend such a step to be taken.

3564. But you would wish to see it universally adopted throughout the country?—Clearly in all cases where there is any disease.

3565. (*Mr. Read.*) You say that the Orders in Council in Scotland are not obeyed?—They are not carried out; they are not acted upon generally.

3566. Who should be the prosecutor when these orders are not observed?—The Procurator Fiscal; what we call the public prosecutor in Scotland.

3567. You have public prosecutors in Scotland, and yet the orders are not obeyed?—Certainly not.

3568. Then you do not think that the public prosecutors have done their duty?—I do not think that attention has been sufficiently called to the matter to see the orders carried out effectually. The country is not yet sufficiently alarmed, particularly as to the danger from the disease spreading.

3569. How long would you suspend the store markets and fairs in the kingdom?—I think that there were would be no harm in doing it till the 1st of March; very few are held in the winter; and before that time Parliament would have met.

3570. I suppose that in the case of all stock which went to a market to be slaughtered you would make it penal for any railway company, or any person or persons, to remove such stock beyond the limits of the town?—Clearly. I would apply that to the owner and the railway company and the servants; every person who has aided and abetted in the movement.

3571. How would you regulate the transit of store stock, provided you abolished all fairs and markets?—People might know by advertisement or by other means that cattle are for sale, and it would be well to have an inspection authorizing the removal of stock.

3572. Then you would not prohibit the transfer of store stock from one farm to another?—Certainly not.

3573. Do you believe it would be possible in this prohibited period to require that in the case of all stock which should be moved, a certificate should be produced from some competent authority to say that they were in a healthy state?—Or that there should be a certificate from a magistrate in the district that there is no disease, and that these cattle may be moved.

3574. You fancy that the local authority can better carry out these suggestions than the Imperial Government?—Yes, I think so.

3575. Would there not be diverse regulations?—It is so, and it will be so; but I think that the pressure which would be brought to bear upon the Government would be so great that they would be obliged to rescind the order generally; and it is better to make it such that the local authorities are responsible for its action.

3576. So long as these measures are employed I suppose you do not particularly care who makes them?—No, I do not; but still I want to make the magistrate residing in a district the responsible party for enforcing the law.

3577. You think that if they made the provisions they would be more likely to see that they were carried out?—Probably they would; but public meetings would be got up immediately, stating the hardship of the requirements. When Parliament meets, I have no doubt that there will be many long speeches upon the subject.

3578. (*Mr. M'Clean.*) Do you propose to close the Metropolitan Cattle Market?—No; except that no stock is to be removed.

3579. When there is an excess of stock, sometimes amounting to one half, would you slaughter the whole of those animals, and prevent their being distributed over the country?—I would wish that within 10 days all animals brought to a market should be slaughtered, so that there shall be an opportunity of their being offered twice in the same market.

3580. You would require these beasts to be slaughtered in London?—If they are brought to London they must be slaughtered in London; if they are brought to Edinburgh they must be slaughtered within the bounds.

3581. Do you not think that that would interfere very much with the distribution of food throughout the country?—I do not suppose that it would make any difference at all in the distribution of food. I may mention that in a case near Edinburgh a farmer took a number of cattle to Edinburgh about a month ago. He was not offered what he supposed their value. He took them home, and within 10 days the greater portion were dead, or were ill, or had to be slaughtered.

3582. (*Dr. Playfair.*) I think you have said that the local authorities have not vigorously carried out the measures in Scotland?—No, decidedly not.

3583. And yet you would intrust the vigorous prosecution of new measures to the same local authorities?—In this way, that I think that if they were called upon to consider this Order in Council they would then feel their responsibility more.

3584. Are you of opinion that local authorities would face the unpopularity of such measures more than the Imperial Government?—They would not face it, perhaps, so boldly; but what I want to guard against is this, that a pressure is brought to bear upon the Government, and after the Order in Council is issued the Government is perhaps obliged to rescind it.

3585. Are you of opinion that this is an imported disease?—No; I am not at all satisfied that it is an imported disease.

3586. But you are satisfied that one diseased animal introduced into a district may produce much mischief?—Yes. I may mention that shortly after the disease appeared in Edinburgh I went with Professor Dick and Professor Strangeways, and examined the byres with them, and I saw the two Dutch cows which were said to have brought the disease to Edinburgh; but I afterwards learned that a cow dealer had purchased a number of cows in London, and had brought them to Edinburgh market, and that those cows were sold to five different cowkeepers in Edinburgh.

3587. Then you believe that these diseased animals introduced the disease into Edinburgh?—Yes.

3588. If certain authorities in England during the time of the importation of cattle neglect their duties, and leave diseased beasts in their districts, how much better will you be when the prohibition comes to a natural end?—Apparently no better.

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3589. Then do you not think that something more is wanted than the separate action of a local authority to extirpate this disease from the country, and that it must be done by a general measure ?—Perhaps it may be so, but I see a difficulty in the Government undertaking the responsibility.

3590. You have said that you think that store cattle may be removed under a bill of health ?—Yes.

3591. Would it not be dangerous that they should pass along the high road where possibly diseased cattle had been sent for slaughter ?—Yes ; but I think that diseased cattle should only be removed in vans, and that no diseased animal should be allowed to travel on a public road or on a railway if known to be diseased.

3592. But you are aware that it is very difficult to know the first stages of the disease, and that even inspectors are unable to determine it.—Yes ; but I believe that it is developed much sooner than veterinary surgeons are aware of.

3593. Do you believe that if there were a possibility of store cattle throughout the country coming in contact with the seeds of the disease sown by diseased animals you would have any chance of stopping the disease in the country ?—I think that the purchasers of the stock would take very good care how they brought stock to a farm, because the disease generally clears off every animal upon it. I have known one case in East Lothian where eleven animals were bought in the Edinburgh Market, and taken home, and within a month or five weeks the oxen and cows upon the farm either were slaughtered or died.

3594. Would not the same roads be used for driving the fat cattle to market and for driving the store cattle of the same district from one farm to another ?—Yes ; but generally people move fat cattle as soon as possible to a railway station.

3595. But if they had to cross over the same road, is there any chance of extirpating the disease from the country ?—I think that there will be no great harm in a day or two, and that if rain falls the danger may pass.

3596. But you may have dry weather also. Are you not aware that the diseased matter deposited has been known in a dry state to last for months ?—No ; I was not aware of it.

3597. (*Chairman.*) Is there any thing else which you consider important for the Commission to be informed of ?—I have already referred to foreign cattle, that they should be kept in quarantine until they are removed to a station to be conveyed to market. I think that they should not be put upon any parks or in sheds, except such as have places set apart on purpose for them. I think that they should be put on to a railway, and sent on to market, and be subject to the same rules as British cattle. I may mention that I find great complaint with the railway companies, on account of the state of their trucks.

3598. (*Mr. Read.*) Would you especially refer to a railway which you know ?—I have seen dirty trucks at the Edinburgh station, and I have called the attention of Professor Dick and Professor Strangeways to them, and I have directed the attention of the magistrates of Edinburgh to the matter. They have some doubts of their power to interfere.

3599. (*Viscount Cranborne.*) To which Edinburgh station do you allude ?—The North British station.

3600. What do you mean by dirty trucks ; merely looking dirty, or obviously containing infected matter ?—Containing the droppings of cattle and sheep ; and they were putting in foreign cattle at that very time while Professor Dick and Professor Strangeways were inspecting before sending them to the Newcastle market, and when I was with them. There were nearly 100 cattle.

3601. (*Chairman.*) Was that since the outbreak of the Rinderpest in the country ?—Within these two months.

3602. (*Dr. Playfair.*) Are the dairies of Edinburgh in a proper and healthy state ?—They are not places that any one who has a respect for short-horned cattle would keep them in, as a rule ; but some of them are pretty good. I consider that all dairies should be beyond the municipal boundaries, and that there should be no dairies within cities.

3603. Have you any licences for dairies in Edinburgh ?—There is no licence that I know of, the same as in London. I may further mention, that I think that the carcases of cattle which die of the disease should, if possible, be sent to a manure manufactory, rather than be buried, because there is some danger of their being taken up again, and either salted or used as food. I may mention the case of Mr. Hope, of Fenton Burns, who had two animals which died of pleuro-pneumonia, three or four years ago, and he buried them. He had some Irishmen cutting drains upon his farm ; they took up the carcases in the night-time, and salted them, and Mr. Hope thought that they cut the drains all the better through the winter, from having had this diseased meat to eat.

3604. (*Viscount Cranborne.*) Have you any experience with respect to the healthiness or unhealthiness of diseased meat for human food ?—Not beyond the case of the shepherds ; the shepherds generally eat the meat of any sheep which die of disease ; they generally cure the quarters of mutton for their own families, and as a rule a shepherd's family who have a little animal food are much better than the family of the hinds who have little animal food.

3605. You have no special experience of the Rinderpest ?—No; except that I have seen soldiers who were out in the Crimea, and also at the occupation of Paris, and they said that they were glad to eat meat of any kind, whether diseased or not. I would wish particularly to impress upon the Commission the importance of having railway trucks cleaned immediately when cattle are taken out of them. The loading banks at Edinburgh are bad. I think that markets, such as the Edinburgh market and the London market, should be immediately disinfected by hot lime, or something of that kind, being spread over them the moment the market is over, and that the place should be cleaned up, to prevent any spread of infection.

The witness withdrew.

Mr. O. Wallis, Mr. C. H. Watts, Mr. G. Osborn, and Mr. W. Shaw.

Mr. Owen Wallis, Mr. Charles Hill Watts, Mr. George Osborn, and Mr. William Shaw examined.

3606. (*Chairman.*) (*To Mr. Wallis.*) You are chairman of the Northamptonshire Cattle Insurance Association ?—Yes.

3607. And you hold a considerable farm in Northamptonshire ?—Yes ; I have two farms.

3608. You are a member of the Council of the Royal Agricultural Association ?—Yes ; and of the Council of the Smithfield Club.

3609. (*To Mr. Watts.*) You have a large farm in Northamptonshire ?—Yes

3610. Are you a member of the Royal Agricultural Association ?—No.

3611. (*To Mr. Osborn.*) Are you a member of the Royal Agricultural Association ?—Yes ; I am a life member of it.

3612. (*To Mr. Shaw.*) Are you the holder of a considerable farm in Northamptonshire ?—Yes.

3613. (*To Mr. Wallis.*) Have you considered the subject of the Rinderpest ?—Yes ; I have paid a good deal of attention to it.

3614. Has there been much of it in Northamptonshire?—Yes; a good deal in different parishes.

3615. Can you trace the origin of it?—In all cases excepting one, it has been traced to cattle purchased at the Northampton Market. I think I may safely say that.

3616. Has it been traced from the Northampton Market to the Metropolitan Market?—Yes; from cattle originally purchased in the Metropolitan Market, and brought to the Northampton Market.

3617. Do you consider that the present regulations regarding the outbreak are sufficient to prevent its spreading?—I think not.

3618. Will you point out in what way you do not consider them sufficient?—I think that there are even now such great facilities for the transport of diseased cattle about the country that infection is traceable to that cause; the disease may not be perfectly developed, but it is in an incipient form, although at the same time in a form which may convey infection.

3619. It is so difficult to detect the first symptoms of the disease, that inspection, however good, is sometimes unable to prevent diseased cattle travelling about the country?—I think so.

3620. Have you considered the subject of stopping the markets and fairs throughout the country?—Yes; and I think that it is the only available means of stopping the spread of the disease.

3621. Has the practice been universally followed in the country of stopping the fairs and markets?—No; I think only very partially indeed, and in no one neighbourhood altogether, so far as I understand.

3622. If the measure is carried out, you consider it important that it should be done generally throughout the country?—Yes; and simultaneously.

3623. There are, I suppose, two kinds of markets, the store market, and the market for fat cattle; would your remark apply to both?—I think that under certain regulations perhaps the traffic in fat stock might be continued, but I think that it must be under very strict regulations.

3624. Have you formed any opinion as to how that could be conducted?—I think that perhaps by a licence, or a certificate from a veterinary inspector, certifying that certain beasts were free from disease, and had not been subject to the influence of contagion, they might be sent to market to be sold for slaughtering, but that they ought never to return again from that market back to farms.

3625. Do you think that certificates of this kind are to be depended upon?—Perhaps that is a question; it might be open to objection; I am not quite sure upon that point.

3626. Supposing that your suggestions were carried out, and that animals were not allowed to leave a market town alive, how would the slaughtering of these animals take place?—If they were not purchased by butchers for slaughtering on their own account, they must be slaughtered, I imagine, on the owner's account, and sold as slaughtered animals, or else put into some place until another market day, away from all other cattle.

3627. Would there be accommodation in country towns for slaughtering of that description?—I think so for slaughtering; I am rather more doubtful as to places for the animals being kept alive; but I have no doubt that they might be slaughtered.

3628. Some of the witnesses whom we have had before us have suggested the stopping of all movement of cattle, and that cattle should be slaughtered on the farms where they are grazed or reared; do you consider that that would be possible?—In many cases, even for slaughtering, they must be driven some distance. I can cite my own case as an instance. I have some fields a mile or a mile and a half away from any village, or any possible house where the animals could be killed, except in the fields; I have no possibility of dressing them.

3629. You could not make arrangements for killing them on your farm?—Not upon my grass farm. Of course I could upon my arable farm; but the other is wholly a grass farm, and I have only one little shed, but that is quite away from the fat portion of my cattle.

3630. With regard to putting a stop to the store markets, are there not now private markets held in different parts of the country?—Yes, undoubtedly there are; and the stopping of the cattle markets would be abortive unless the whole of that description of cattle were prohibited from removal at all.

3631. What has occurred in that respect in Northamptonshire?—Droves have been placed for sale on pastures belonging to inns in the villages, and they have been met there, and purchased there, and if not purchased there they have been driven on to other places of the kind.

3632. And there has been a danger of purchasing diseased animals, or animals which have been in contact with diseased animals?—Yes; I think quite as much as if they had been driven into a market.

3633. Would very great inconvenience occur to the farmers in your neighbourhood if all movement of store cattle were stopped?—There is no doubt that great inconvenience would arise, but I think that it is one of those things which will have to be submitted to before the disease is eradicated.

3634. You would rather submit to that than have the danger of these fairs going on?—I would, individually, certainly.

3635. (*Mr. M'Clean.*) Do you think that it would be possible to regulate the supply of London animal food if none of the beasts at the market here were allowed to leave?—There would no doubt be some difficulty in the first instance, but I should think that it would be one of those things which would be ultimately brought about; it, of course, would be attended with a good deal of difficulty.

3636. How is it to be regulated?—I imagine only by sending the slaughtered animals to the dead market.

3637. (*Mr. Read.*) Do you think that there would be any practical difficulty, in the cold weather during the next three months, in slaughtering the live cattle in London, and sending them to any part of the kingdom?—No; I do not see why there should be any difficulty in it. I believe that carcases are constantly sent from Scotland to the London markets all through the winter months, and I do not see why the same thing should not take place from London to any part of the provinces.

3638. Would you tolerate all fat markets?—I think that you must tolerate all, if you tolerate one.

3639. We will take the cases of London and Norwich. London supplying a large population, and Norwich being a market where every butcher could supply himself from a farm with all the fat stock that he wanted?—Yes; there is a difference between the two cases, undoubtedly.

3640. Whereas the stoppage of the London market would be next to impossible, the Norwich market might be advantageously closed?—Yes; that is possible.

3641. You have said that you would prohibit the entire transit of all store cattle?—Yes; I would, certainly.

3642. Would it not be a very great hardship to those farmers who have a lot of turnips to consume, and have no cattle (take the case of the eastern counties), that they should not be allowed to stock their farms for the next three months?—As I have said before, great losses and great difficulties would be experienced; but it is the choice of two evils, whether you will go on with the disease, or whether you will check it in its present form.

3643. Would there be more risk of spreading the plague, if, for instance, I went to your pastures, and bought 20 bullocks, and took them into Norfolk, than by fat bullocks being sent to London?—I should only send to London beasts perfectly fat and fit to be killed, and in the other case you would buy beasts in a half fat state, and have to keep them for feeding.

3644. Do you think that they would be very much

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endangered by the transit?—I think that they would.

3645. Then you would prohibit all dealing between one farmer and another?—I do not know how you are to make a partial dealing; you must either restrict it altogether, or permit it, and if you permit it I do not know how you are to check the disease.

3646. Would it not be possible to make it penal for any person to congregate, or exhibit for public or private sale, any stock on any public or private property, and to stop these private fairs which are being held, so that you might stop all traffic, and all trade in store stock, except from one farm to another?—I do not see what the distinction is between the two cases, whether you buy directly from a farmer, or through the agency of a third person.

3647. I suggest that the cattle should go straight from one farm to another, and should on no account be exhibited for sale or congregated in any public place?—I see a distinction in that case; but then there is a liability of infection by the transit; that is the difficulty which I see in the matter. There is another point upon which I would remark, namely, that I think that it is useless to expect to prohibit the sale of cattle simply by a fine of 20*l.* for the non-observance of the Order in Council, inasmuch as if a man has a considerable number of beasts which have been liable to infection he would lose a great deal less by paying the 20*l.* fine than he would gain by the sale of his stock, supposing that he sold them at something like their value.

3648. You think that in the eastern counties we should be totally destitute of stock for the next three months, rather than run the risk of extending the plague?—I am not sure whether three months will be required.

3649. We will say two months?—Yes.

3650. You think that we had better be without them?—I think that you had better be without them than run the risk of receiving diseased animals, and perpetuating the disease.

3651. (*Viscount Cranborne.*) Can you form any estimate for your own county of the amount of loss which it would be to the farmers; is yours a grazing country?—Yes; it is mixed; it is perhaps chiefly grazing; but it is also mixed, namely, arable and pasture land; a good deal of stall feeding goes on as well as summer feeding.

3652. Can you give any estimate, however rough, of the amount of loss which would be occasioned from the farmers being forbidden to buy cattle for fattening?—I could not possibly give any approximate amount.

3653. Would there be any difficulty in enforcing the slaughter of all animals which were brought to fat markets?—I think not; I think that the demand would pretty soon be found out, and that the supply would soon regulate itself pretty well to the demand.

3654. Could you trust the butchers to take away the cattle to their own slaughter-houses to kill?—I think so; there might be cases where they might be sold again after being purchased.

3655. Would it be safe to insist that they should all be slaughtered directly after the market? Is it not commonly the practice to keep the beasts 24 hours in order that they may be in a fit condition for slaughter?—Yes; I suppose that all butchers fast them for a certain period after purchase, but I suppose that the cattle which would be slaughtered on account of the owners would be subject to the same process of fasting.

3656. During that period there would be considerable facilities for getting them away if any people were dishonestly disposed?—I suppose that there might be. I do not know how that could very well be checked.

3657. Do you think that it would be wise to have fields attached to the town, under the supervision of local authorities, where the animals should be kept during the time which should intervene before their slaughter?—I do not know; all the butchers who slaughter them on their own account take them directly to their own premises, and fast them, and kill them perhaps on the following day.

3658. If you had no such fields under the supervision of the local authorities, it would be necessary to take security from the butchers?—I should think that it would.

2659. At this season of the year would they take them into fields, or would they take them into sheds?—I think that they always take them into their own sheds.

3660. (*Dr. Parkes.*) You have a large market at Northampton, have you not?—Yes.

3661. What are the measures now taken there regarding the disinfecting of that market?—Until the last fortnight, excepting the ordinary sweeping and scavengering, which all the town undergoes, nothing was done. I suggested that they should use disinfectants, chloride of lime, and other things, upon that part of the market where the fat stock are exhibited, and I believe that they have done so. I also suggested that they should destroy the manure arising from the sweepings, because this manure ultimately going upon the farms might be a source of contagion at a future day.

3662. Do you think that those measures have been carried out to a proper extent?—I believe that they have. I understand that the town commissioners had taken measures of that kind.

3663. To prohibit the sale of manure, or to disinfect it?—I think to disinfect it.

3664. Have any instances come to your knowledge in which the disease has been propagated by means of manure?—No. I have not had an animal with the disease myself, nor have I seen any cases of it, and therefore I am not able to speak upon that point, but I think that it is a very probable source of contagion, and perhaps the most probable.

3665. (*Chairman.*) Is the place where cattle are exposed for sale at Northampton of such a character that it can be readily disinfected?—Not very readily, because they stand on a considerable space of ground, and I have understood that it would be an expensive process to disinfect the ground upon which they are placed.

3666. The cattle market extends to several streets, does it not?—I am speaking more particularly of the fat cattle market on the Market Hill, which comes under the province of the corporation; but the store fairs and markets extend over a very considetable area, comprising many streets, and very long streets.

3667. And it would be rather difficult to disinfect those streets effectually?—I think that it would be wholly impossible.

3668. Where are the fairs for lean stock held?—Excepting two months in the year, namely, July and October, I think that we have one every other month in the year. There are two fairs in November. There are about 12 fairs, I think, in the year, as far as I remember.

3669. You would not consider the place where store animals are sold in Northampton satisfactory for such a purpose?—No; I think that it is almost certain that if diseased cattle were taken into that market it would be a means of propagating and spreading the disease.

3670. More so than if they were sold in a more confined space, which could be disinfected and regulated?—I do not know that.

3671. (*Viscount Cranborne.*) I suppose that you would include private auctions in the prohibition, as well as fairs and markets?—You mean auctions on the premises where the cattle have been fed?

3672. Yes?—If they are to be purchased, I imagine that it does not matter whether they are purchased by public auction or by private contract, supposing that they are upon the ground where they are fed.

3673. But if they are sold for the purpose of being carried away and fattened, they should be prohibited just as much in private as in public sales?—I do not

see any distinction whether a farmer sells them himself or employs an auctioneer to sell them.

3674. (*Mr. Read.*) But you would not allow a farmer to sell his store stock at all?—Certainly not.

3675. (*Chairman.*) (*To Mr. Shaw.*) Do you agree generally in the views which Mr. Wallis has stated?—Not altogether.

3676. Will you state the points upon which you have formed a different opinion?—I think that that portion of his evidence with regard to store stock is not practical. I think that if cattle could be sold with a direct consignment from farmer to farmer, with a clean bill of health from an inspector, business might be carried on. You may as well have one loss as another, and I think that there would be less loss in one case than in the other. If you have a large turnip farm you will have a great loss arising from the non-consumption of the turnip crop, as well as the loss of crops for three or four years.

3677. But it is your opinion that the fairs for store stock are the means of spreading the disorder, is it not?—Most decidedly, and I should certainly wish them to be stopped as quickly as possible.

3678. Do you think that it would be better to do that, and to suffer some inconvenience from not being able to sell or buy stock?—Yes. I think that what has been suggested by Mr. Wallis would be a total interruption to business. No doubt his is the readiest way of stopping the disease. I, however, hardly see my way clear to the shutting up of all private bargains.

3679. Do you think that you could always depend upon certificates being given by one grazier to another?—I would make it very penal, and would inflict a penalty, 5*l.* per head, if you could show any violation of a confidential arrangement of that sort. I think that, even on Mr. Wallis's own farm, he must move his own stock; in ordinary occupation, in this country, they cannot be kept where they are.

3680. You think, then, that, however desirable this step might be, it could not be practically carried out?—I do.

3681. I suppose that the same remark would apply to the sale of fat stock?—No. I think that there is a great difference between the two cases. I think that you might enforce the immediate slaughter of all fat animals without any very great inconvenience, as the demand and supply would soon settle themselves. I would risk that.

3682. Would you allow a butcher at Birmingham to buy animals in the Metropolitan Market and take them alive to Birmingham?—No, certainly not; he should slaughter them in London or whereever they were bought.

3683. (*Viscount Cranborne.*) You do not think that there is any difficulty or risk with regard to killing meat in this weather?—No, certainly not; at any rate not for the next six months.

3684. Could a butcher lay up his meat for a week?—There is no occasion for it; there are daily, almost hourly, trains; there are almost daily markets; and I see no reason why quarters of beef should not go by train to market in preference to live animals, which not only suffer, but bruise and deteriorate by the journey.

3685. The butcher could not go up to market and bargain for the cattle himself?—No; there is no necessity for his going to market; he can have it all done by commission.

3686. Do you know what is the practice, whether butchers go up to the weekly market, or do it by commission?—In the hottest weather the butchers buy live animals, but in ordinary weather dead meat might be conveyed with safety. Practically we send dead meat to London, and do not receive it from London.

3687. We have had evidence that a great many animals are brought for the purpose of killing to the Metropolitan Market, and are carried off to Birmingham and other parts of the country, and killed there?—Yes; I believe that it is the case from Christmas to June; but at this time of year it is just the contrary.

3688. (*Chairman.*) The fact is, I suppose, that in the grazing counties the farmers buy to graze in summer, and that in the arable counties they buy to feed in winter?—Yes; practically so.

3689. (*Mr. Read.*) Do you think that if one farmer bought of another, and took care in the transmission of his stock, there would be any very great risk of his spreading the plague?—I do not think that there would, if he was careful of whom he bought his beasts. I think in our county, owing to the caution which is used, we have less of the disease than we had, and I also think if the disease had not been imported into the county from London we should have known very little of it.

3690. Of course you think that the principal danger is from the congregating stock together in markets and fairs?—Yes; and I think that a great deal of disease (I will not say this disease altogether) arises from the cruelty of men who call themselves jobbers. I will give you a case in point. I can prove that a lot of beasts were bought in Lincolnshire last year; they left the farmer's yard on Sunday; they stood in a fair there on the Monday; they travelled on to Harborough in the course of the night, and stood at Harborough; they came from Harborough to Northampton; the same night they walked from Northampton to Wolverton; then on to Banbury; they were not sold there, and they were brought back to Wolverton again. There were five clear days of exhaustion for the animals, and I think that it requires some law to stop such cruel acts. We shall never be free from disease while this is the case.

3691. You think that the treatment which cattle receive in their transit from one place to another engenders disease?—I do. In fact we are never free from disease.

3692. I have gathered from your previous answers that it is your opinion that it would be no great hardship to kill all the fat stock which are exhibited in certain markets within the towns in which those markets are held?—Yes; that is quite my opinion; I think that it is quite feasible.

3693. Especially in the weather which we may expect between this and Christmas?—Yes; in the next three months I am sure that you may do so.

3694. (*Mr. M'Clean.*) Would you allow cattle sold at the foreign cattle market at Hull to be distributed through the country?—I would, if slaughtered.

3695. Then all the animals, amounting to about 16,000 a quarter, must be slaughtered at Hull; what would you do with the offal?—I cannot say. I do not believe there would be that quantity if they were slaughtered on arrival, as we should only have fat things,—what the country requires, instead of the half fat, miserable things sent over now, which are only walking skeletons, and the very medium to carry disease all over the country, as they are worth nothing to the butcher.

3696. But you would require all the beasts which were imported and sold at the market to be slaughtered?—I would.

3697. The same remark would apply to Harwich and the places which supply London?—Yes; it could go to London dead; and the new Newgate Market is the proper place for it.

3698. Would not that put a stop in a great measure to the importation of foreign cattle?—No; not if they were fat. You might convey any amount of meat from one market to another.

3699. (*Chairman.*) (*To Mr. Watts.*) Have you anything to add to the evidence which has been given by Mr. Wallis and Mr. Shaw?—Nothing particular. I quite agree with Mr. Wallis, that I would stop the whole of the markets and fairs for store stock; but I hardly see my way clear as to how you are to do so with regard to fat stock. I would have all fat stock going to a market, if it was not sold there, killed; but I do not see how

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you can prevent country butchers buying in villages, and driving the animals a few miles to kill. There are a great many feast times now, and I do not think that a farmer would always have an opportunity of killing the animals at his place. I would decidedly prevent the removal of store stock entirely for a limited period. I think that three months would incur a great hardship on our people. I would say perhaps six weeks.

3700. Are the farmers in Northamptonshire now in want of store stock?—This is the time when we buy stock more largely than at any other, for keeping for the winter; but I think that, though it would be a hardship, we could put up with it for about six weeks; it would be a great hardship if it was for three months.

3701. (*To Mr. Osborn.*) Have you anything to add to what has been stated by the other gentlemen?—No; I agree with Mr. Wallis in his remarks.

3702. You have been rather a large loser?—Yes; I have had seven animals buried in one field which had the disease. They were bought at Northampton market on the 19th of August, and they first showed symptoms on the 7th of September, about 19 days afterwards; they were isolated on my farm. One bullock is getting well, and is going on well.

3703. (*Dr. Playfair.*) Were there no other diseased cattle in the neighbourhood?—Not near my farm.

3704. How near your farm were they?—I cannot say.

3705. Were they within one or two miles?—They were further, I should think; they were, I should think, within three miles, as far as I can tell; at least I did not hear of any nearer at that time.

3706. During that time did any of your people go to see the diseased beasts in the neighbourhood?—No.

3707. (*Mr. Read.*) Your are pretty sure that the disease was conveyed from Northampton market?—I have no doubt of it, because the veterinary surgeon who attended my beasts stated that he could trace all the beasts back to that one Saturday.

3708. Can you tell us whether there were previous outbreaks to yours from that Saturday?—Not that I am aware of.

3709. Yours was the first?—Yes; mine was the first case in the association. I bought six store beasts on the Market Hill at Northampton; winter beasts to be fed next summer.

Mr. Wallis.—The remaining portion of that lot of beasts went to the neighbourhood of Banbury, and died there.

Mr. Osborn.—I was very near buying ten more, and I understood that a few days after they were sold they went to the neighbourhood of Banbury, and died there.

3710. (*Dr. Parkes.*) Do you consider it quite impossible that those beasts were exposed to any other chance of infection?—I am quite certain my own were not, after I bought them, because I was very particular, and kept my closes free from all stock that adjoined the close where they lay.

3711. Were the beasts which went to Banbury sold on the same day?—No; they went upon the following Thursday to be sold.

3712. Were they attacked with the same disease as your beasts were attacked with?—I cannot say.

Mr. Wallis.—They ultimately died of it.

Mr. Osborne.—The first heifer which I had is getting well.

3713. (*Chairman.*) From your experience in Northamptonshire, are you of opinion that there is any cure for the disease by medicine?—I should say not.

3714. (*Mr. Read.*) Do you think that fat stock might be slaughtered in the town in which the market is held without any great inconvenience?—There would no doubt be some inconvenience attending it.

3715. I said, great inconvenience?—It would, I think, be a great inconvenience at Northampton.

3716. Why?—There is a great consumption at Northampton, and I do not know where the butchers could find places to slaughter the animals in, as there is a large quantity of meat consumed in the town that is slaughtered by butchers in the neighbouring villages.

3717. But what has that to do with killing at Northampton?—Many of them have not convenience for killing beasts, although they may have for sheep.

3718. Surely they would have the same convenience to buy the meat in Newgate Market then as now?—Yes. I cannot speak much about the Northampton meat markets, because it is out of my line altogether.

3719. (*Chairman.*) (*To Mr. Shaw.*) Do I rightly understand you, that the meat which is exposed for sale in the butchers' shops at Northampton generally comes from London, and is not from bullocks slaughtered at Northampton?—No; quite the contrary. The way that the butchers do with us, so far as I can gather, is this, they probably all of them buy more meat than they can vend in the country; they keep the rougher parts at home, and send all the best joints to London; that is how I conceive that the trade is carried on; it is a complete business with our butchers to send the best parts to London. When they have beef from London they have live beef, as a rule.

Mr. Wallis.—Undoubtedly.

3720. (*Mr. Read.*) (*To Mr. Shaw.*) Where are the fat cattle which are slaughtered in the Northampton market sent?—I should say about half is bought by the butchers and slaughtered; the other half is taken by the jobbers alive to London.

3721. (*Viscount Cranborne.*) And that you would stop for a time?—Yes; in order to get rid of this disease, as far as possible.

3722. (*Chairman.*) Is there anything to which you wish to call the attention of the Commission beyond what has been stated?—No; only that all fat beasts, no matter where they come from, should, after their first exposure for sale, be at once slaughtered.

3723. Have you any further remark to make?—I quite agree with Mr. Wallis that the penalty of 20*l.* is insufficient.

3724. (*Viscount Cranborne.*) You mean that it is too small?—Yes.

3725. (*Mr. Read.*) Perhaps you would prefer having it so much per head?—I would.

3726. Such as 5*l.* a head?—Yes.

3727. (*To Mr. Wallis.*) Have you heard of any cases of Cattle Plague affecting sheep in your district?—Not in our district, certainly.

The witnesses withdrew.

A deputation from the City of London was called in, consisting of the following gentlemen:

Right Hon. the Lord Mayor, S. Gibbins, Esq., Dr. J. W. Tripe, Dr. Aldis, S. K. Ellison, Esq., Dr. J. Whitmore and T. Sarvis, Esq.

The Right Hon. The Lord Mayor.
S. Gibbins, Esq. (Chairman of the Markets Committee).
Dr. John W. Tripe (Medical Officer of Health for Hackney District).
Dr. Aldis (Medical Officer of Health for St. George's, Hanover Square).
Samuel K. Ellison, Esq. (Medical Officer of Health for Poplar).
Dr. J. Whitmore (Medical Officer of Health for Marylebone).
Thomas Sarvis, Esq. (Medical Officer of Health for Bethnal Green).

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3728. (*Chairman.*) (*To the Lord Mayor.*) The Commissioners will be glad to hear the views entertained by your Lordship and the other members of the deputation on the subject of this inquiry.

(*The Lord Mayor.*) I appear before the Commissioners as a member of this deputation, at the request of the committee, but I really have very little to say. I attended two or three meetings with Lord Granville at the Privy Council Office, and I then stated the views which I entertained. I have seen nothing to induce me to alter the views which I then held, but, on the contrary, I think they are now confirmed. It appears that nothing has been done in the way of a curative process, and nothing is done but destroying everything that has come in contact with any diseased cattle. We find that they are being destroyed in very great numbers, and it is rather alarming. I think that medical skill or medical science ought to be brought to bear upon the matter, and that there ought to be places to which some of the diseased animals might be sent, and that a remedy might be found. I think it is possible that a remedy may be found, and that it would be a sad reflection on the medical men of this day if they should not find something as a remedy for this disease. There is another thing that I would mention: It appears that in some parts of the country they are now prohibiting the cattle from being carried from one place to another, except for the purpose of being slaughtered; that I think is a wise plan, but whether such a plan could be carried out in London I do not know, or whether those parties who have cows to sell, or any lean stock to sell, ought to be prevented from doing so. I suppose you may have seen in the papers a statement that some men made, who were summoned before me, that they were altogether ruined; one of them stated that he had left Wales with 136 bullocks; that he sold 12 of them on the road, and when he got to Barnet fair, some of the animals were infected with the disease, and all the rest, the 129, died, or were slaughtered. It appeared that another cattle dealer left Wales with 105; he was fortunate enough to sell 32 of them on the road; he brought the remaining 73 to Barnet Fair, nearly all of which died, and the others were slaughtered, and these men were put to the expense of burying them. Now whether those cattle brought the disease to the fair, or whether they caught the disease by grazing along the road, or the disease attacked the cattle before they got there, I cannot say; but it showed itself so soon, upon simply being taken to the fair, and the cattle died in the course of three days. I believe that Barnet Fair is held for three days. Mr. Gibbins has come furnished with some documents which, if not new, I think he would be justified in putting before the Commissioners.

Mr. Gibbins.—It will not be necessary for me to go again over the examination which took place last week. I will, therefore, confine myself simply to one or two observations, leaving it to the medical gentlemen, the officers of health for the metropolis, and who are members of the Cattle Plague Committee, to state their views to this Commission. I would, however, state that at a committee held at the Mansion House a few days ago it was thought before the Metropolitan Cattle Plague Committee dissolved entirely it would be advisable, and they thought it most desirable, that they might be permitted to wait upon this Commission. The Commission having granted their request, they are here to state their views on the subject. There were one or two questions put to me the other day which I will endeavour to answer now; but the general returns I will reserve for a future day, as they are not all quite made up. I will make them up, and send them to the Commission in a perfect form to-morrow or next day. On the former occasion I was asked particularly as to the date of my first knowledge of the disease in the market. I have now ascertained that it was, as I then stated, about the 26th of July, when we were informed of it by our own inspector; the first official letter that we received upon the subject was one dated the 2d of August; this was addressed to the Lord Mayor. He sent it to me, and, having already taken action in causing the market to be disinfected, &c., a special committee was called. Since then we have been constantly at work. I know that about the 26th of July they began to take action officially, and we knew of this on the 2d of August. With regard to the other questions, one of them was as to a return of the number of cowsheds in the metropolis. That had best be ascertained by reference to Dr. Druitt or to Professor Simonds. Officially, as a committee, we have no cognizance of the sheds round the metropolis; but, by an application to Dr. Druitt or Professor Simonds, no doubt the information may be obtained. All the other returns I can make. Dr. Tripe, the medical officer of health for Hackney, will be glad to make a few observations upon two or three points.

3729. (*Chairman.*) (*To Dr. Tripe.*) Will you be good enough to state the colleges to which you belong?—I am a Doctor of Medicine, a Licentiate of the Royal College of Physicians, Edinburgh, a Member of the Royal College of Surgeons, and a Licentiate of the Apothecaries Society. There are two points to which I wish specially to refer in the observations I shall make upon this matter; the first is, that it is I believe the almost unanimous opinion of the medical profession, that treatment in this disease would avail. They consider that the system of killing is unscientific, and unworthy of the position which England has attained in civilization, and also that it is a bad system in a money point of view. I have been informed of several instances in which animals have recovered after having been condemned by an inspector. I believe treatment is most likely to be successful in the commencement of the attack. I may also state that I believe, by auscultation of the lungs, and careful examination of the animal, the disease may be detected in a very early stage. I may state that I have auscultated several cows, and found certain alterations in the breathing sounds in each, indicative of approaching congestion of the lungs, before the running from the nose or the eyes took place. The symptoms of Cattle Plague, like other diseases arising from blood poisoning, do not manifest themselves invariably in one particular way, but still there are certain symptoms which are sufficient; earlier symptoms,—I would say,—than those which have been pointed out in the Order in Council,—which might be used for the detection of the disease. I think, upon every ground, that a sanatorium should be established. I will now refer, if you will permit me, briefly, to the working of the present Order in Council, from which I think the Commissioners will see some of the difficulties of the case, and some of the modes by which the disease has been spread throughout the metropolis and England generally. They strongly point out the necessity for the establishment of one or more sanatoria, and that far less damage will be done in removing the cattle from the

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sheds to the sanatoria than at present obtains in moving diseased or dead cattle to the knackers. The first Order in Council directed cowkeepers to give information to the Clerk of the Privy Council of the first appearance of the Cattle Plague in their sheds. But as the giving of this information might lead to the slaughter of all their stock, the cowkeepers, as a rule, at first neglected to give this information. In my opinion you could not expect that as men of business they would do it; and I do not hesitate to say that the Orders in Council have been and will be disobeyed, indeed as a matter of necessity they must be disobeyed, unless persons can see their way to some compensation. It was a knowledge of this fact, that people would not give the necessary information, that led the Mansion House committee to take up the matter of compensation. It was in the hope of gaining early information that they pressed this matter upon the public; but that scheme has failed. Still, with all due submission to the Government authorities, I cannot help saying that I think the Government will have to obtain a bill of indemnity, or else to pay the cowkeepers for the losses which they have sustained by the slaughtering of their cattle. I believe that there is nothing in the Act of Parliament which authorizes an order for the destruction of cattle. If that be so, and early slaughter is the best mode of stopping the disease, it seems to me that it would be much wiser to meet the matter at once, and to give a certain amount of compensation, for the purpose of obtaining early information. If the system of destruction is a correct one, the disease should have been stamped out at once. The first Order in Council, and all published since, throw upon the cowkeepers, under heavy penalties, the duty of giving information which might lead to their ruin. This, in my opinion, is not the best way to obtain early information; but that we should, instead, adopt a plan of shed-inspection carried out under a proper system, by which it could be early ascertained where the disease was, and so enable the inspectors to enforce such measures as might be deemed advisable. The Orders in Council have been oppressive to the cowkeepers in the extreme; nothing could have been more so; they were compelled at first to keep the diseased and the healthy animals together, unless they consented to their slaughter. At first the inspectors allowed the removal of cattle from the infected sheds; and I know of one instance in which, before the issuing of the second Order in Council, between 50 and 60 cattle were removed from one shed to the Metropolitan Cattle Market. At that time there were in the shed three cows frightfully diseased, all of which, I believe, died; two others subsequently took the disease. I visited the shed on a Friday; on Monday the shed was cleared out, with the exception of five. Fifty or sixty cows which had been exposed to the disease for several days were taken to the Metropolitan Cattle Market, and thence distributed throughout the country.

3730. Can you state the date of that occurrence?—Yes, by referring I could, but the Government cattle inspector for Stoke Newington could give the date when he visited the shed.

3731. (*Mr. Read.*) Was it before the 2d of August?—It was before the second Order in Council became known. The Order in Council appeared on a Friday, and it was published in the papers on Saturday. I visited the shed on Friday, the day on which the second Order in Council appeared, and the inspector visited the shed on the Saturday. The cattle were removed to the market on the Monday. I think it was in the first week in August.

Mr. Gibbons.—I think it was about the 10th of August.

Dr. Tripe.—I may state that this system has prevailed, and is still prevailing to an extent which this Commission is not at all aware of, and the plan of poleaxing, or compelling persons to keep cattle in infected sheds, leads to the whole of this system. I will now refer to a return from Mr. Valentine, the inspector of nuisances for the Hackney district. He is assistant to the inspector who was appointed by the justices of the Tower Hamlets, and whose appointment has been countersigned by Mr. Helps. Mr. Valentine was appointed by the Board of Works of the Hackney district, to ascertain the condition of the cowsheds generally; to visit them from time to time, to see that the animals ordered to be buried were properly buried, and to act as assistant generally to the inspectors, Messrs. Child & Corby, in Mare Street, Hackney (the two, conjointly, act as one inspector in the Hackney district). Before the outbreak there were 82 cowsheds, in which 1,220 cows were ordinarily kept. The earliest outbreak, so far as I know, took place in Hackney in the latter part of July. Mr. Valentine reported to me that since that time nine cows have been buried, 136 have been sent to the knackers, and 596 have been removed, making a total of 741 out of 1,220. I believe there were many other instances of cows, apparently healthy, being sent to market from infected sheds; a large number of those 596 were sent to the market, but part of them were sent to slaughter-houses in the neighbourhood, and what became of those we do not know; so that here, out of 1,220, 596 had been thrown upon the markets or upon the slaughter-houses, and had most probably been used as food.

3732. (*Chairman.*) The 1,220 cows was the number of cows which were ordinarily kept in the Hackney district?—Yes; in 82 cowhouses. But I wish to call the attention of the Commissioners particularly to this fact, that out of this number only nine have been buried on the premises; the Order in Council is to bury them on the premises; but that order will be evaded. I see a modification of it in to-day's paper, but that modification has been really carried out previously; and if this obtains in a suburban district like Hackney, what, I would ask, must happen in the city, or in a place where there are no fields or spaces to bury carcases in? I issued, by order of the Board, directions to the cowkeepers for purifying sheds, and for disinfecting the animals, in the hope of checking the disease. The report of the inspector was that there were only nine buried out of this large number. What became of the 139 that were sent to the knackers I cannot tell you; but with regard to the 596, there is little doubt that most of them were sent to the markets, or to the slaughter-houses, to be prepared for food.

3733. Did those 596 animals come from the infected dairies?—Clearly, every one of them, unless there is some error in the return. Upon this are based my propositions; viz., that the establishment of sanatoria and Government slaughter-houses would lead to a far less injury to property, and to far less spread of the disease, as well as give an opportunity for treating this disease upon a scientific and medical basis. 596 of the whole number were sent away; some of them were driven away; they were not removed in knackers' carts; 136 were taken away in the last stage of disease, or when dead; and nine were buried out of 741. What an amount of disease must those 741 animals have spread, while they were being removed, without any precautions being taken to prevent the contagion; whereas, if they were moved to a sanatorium, the coats of the cattle could be disinfected; a cloth covered with disinfecting fluid put over the vehicles used for moving them; and also sand, or any other absorbent, might be sprinkled at the bottom of the trucks, for the purpose of receiving anything that might drop from the animals. With proper means I consider you would be able to remove animals to a sanatorium with far less damage to the public health, by having the cattle conveyed in proper ambulances, than by the present mode of removing them to knackers' yards or slaughter-houses or to markets. There is another point upon which I will make a few remarks; and it is as to the slaughter of fat animals. I think that the animals brought from the infected localities or London cowsheds to the markets might

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be slaughtered immediately after they were sold without any great loss to the owners being incurred; and that healthy animals coming from non-infected places might be distributed throughout the country. I think that that would be a kind of compromise between the system of slaughtering animals and that of distributing them, as, certainly, has been done, by means of the Islington Cattle Market, broadcast throughout the country. This disease has originated, I believe, in the London cowsheds, because the London cows after a length of time become completely changed; their coats become thinner and shorter, and they are more liable to pleuro-pneumonia and other diseases, and are far more delicate; they are fed upon grains and upon other matters, and after a time they get into an unwholesome state; just in such a state as, after the summer we have had, would be likely to induce a disease of this kind. I have attempted in many instances to find out how the infection has been conveyed; and I have utterly failed in ascertaining, in many instances where the cowsheds are situated some distance from any thoroughfare, any means by which the herd could have been infected. In several places no fresh cattle had been brought into the sheds for six or seven weeks before the outbreak had taken place, and I have been informed that all strangers had been strictly excluded from these dairies. Several were places to which there was no public throughfare certainly within 100 yards, and yet the disease has appeared there, and swept all away. In one shed 27 were carried away, and I could not discover any means by which the infection had been brought to the place. The same thing has happened in many other sheds in the district.

3734. (*Viscount Cranborne.*) How near might any infected beasts have been in the case you have referred to?—They could not have come within 100 yards; the cows were placed at the back of the premises, and no beasts could have come within that distance of them.

3735. (*Dr. Parkes.*) I presume that the reason for killing beasts which are affected with the Rinderpest is to get rid of the contagion as quickly as possible?—Quite so.

3736. But if those which are in an incubative stage of the disease are not killed I do not see that we shall be much better off. An animal is ill with Rinderpest in a dairy, and instead of killing it you desire only, as I understand, that it should be taken to a sanatorium?—Yes.

3737. What would you do with all the rest?—I would leave them in the shed, using of course proper disinfectants, and disinfecting the animals, so far as that can be done; you cannot disinfect the inside of the animal, but you can disinfect the coat.

3738. Then you would issue an order that no animal should be removed from or admitted into that shed?—Yes; I would also have a system of shed-to-shed inspection, and a personal inspection of every animal, either daily or every other day, by which means the first symptoms of the disease would be detected; for I hold that if not detected in the early stage you are too late either to slaughter or to treat with much hope of success.

3739. That constant inspection would be carried out in the case of a cowshed in which the disease had appeared?—Yes; I would have every cowshed visited, because I believe that the cowkeepers will not give you the information sufficiently early, if at all. For instance, I have been told by cowkeepers that they had not lost any cows, when I knew from trustworthy information that they had lost many. One man had lost 15, and said he had not lost one.

3740. To carry out a system of inspection of that kind, what staff do you think you would require in Hackney?—We have 82 sheds there, and 3,300 acres. I should say that four inspectors would be required, or three at all events, to carry out such a system, and to devote all their time to it.

3741. How many inspectors are there employed now?—Two; the inspectors do not devote their whole time to their duties, and are only required to act after receiving information; that is, they do not usually act of their own accord; and there lies the error of the system.

3742. I think I now understand your plan; but what evidence have you to show that the disease is curable?—I have very little evidence upon that point, because the only treatment advised by the inspectors has been the slaughtering of the cattle, so that very few have been treated. Some have been treated upon one plan by the cowkeepers, and some upon another. My own opinion is, that some systems of treatment have proved decidedly objectionable, and others have proved beneficial; but as I do not know of any number of facts I cannot give you any data upon which to suggest a cure.

3743. Your recommendation of sanatoria is based upon general principles, and not upon any practical experience as to the curability of the disease?—I can state this, that of many animals which have been condemned by the inspectors, and ordered to be killed as being incurable, several have recovered when they have been left entirely to themselves.

3744. How would you manage in the country districts where no sanatoria were established, and the disease entered for the first time?—I would kill the animal at once.

3745. And put the remaining animals on a farm, or in a herd, under inspection?—Yes; and I would properly disinfect the sheds and the animals themselves.

3746. If another animal took the disease you would kill it?—Yes.

3747. Wherein would such a system as that differ from that which is now in force?—In this, that the disease had spread extensively before this system was carried out. I think that killing a few animals in an isolated place would be sufficient to stamp out the disease; but where the disease is once disseminated throughout the country I think the plan of killing is one by which a far larger number of animals will be lost than by treating those which are affected by the plague.

3748. Referring to the first symptoms which are exhibited, most of the reports on Rinderpest state that the lungs are found to be sound?—All I can say is, that upon auscultating cattle I have in most instances found, in the first place, a remarkable dryness in the breathing; just what you observe in the very early stage of pneumonia; and, secondly, you find to a certain extent congestion and crackling; but a gentleman present, who has seen a large number of cases, far more than I have, will be better able to speak to this than I am. With regard to the lungs being diseased, I can say that I have noticed an alteration in the breathing.

3749. Have you observed that in cases not complicated with pleuro-pneumonia?—Certainly, as far as I have seen, no pleuritis has ever existed; and, secondly, I have observed that the lungs do not consolidate; they become heavy and congested, and the blood is dark, and it coagulates very firmly indeed; therefore differing materially in the post mortem appearances from pleuro-pneumonia.

3750. Can you state the date in the month of July when you first became acquainted with the existence of the disease?—I should say that it must have been about the 30th or 31st of July; but some animals had died in the district before that.

3751. At what date?—I think it must have been about the 17th of July, but I am not certain upon that point. I know that a herd was sent on the 17th of July out of the district, and that a large number of that herd died before the end of the month.

3752. Do you know from what dairy they were sent away?—Yes.

3753. Can you give the name of the dairyman?—His name was Strong; it was either Strong's cowshed, or the cowshed at the Triangle in Hackney but I will get accurate information upon that point.

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3754. You think the date was the 17th of July ?—Yes, when he sent the herd away, and the disease broke out subsequently in that herd, and, as he states, he lost the largest number of them.

3755. It has been stated in evidence that the first case in Hackney occurred on the 28th of June ?—I am not aware of that case. Might I ask in whose shed it was ?

3756. Mr. Baldwin's ?—I think that Mr. Baldwin's shed must be in Dr. Sarvis's district; probably in the Hackney Road.

3757. In what condition are the dairies in Hackney generally ?—They are in fair condition. I do not consider them in first-rate condition ; but a committee has been appointed by the board to inspect the cattle sheds, as well as myself. I go round first, and point out any alterations that I require to be made, and then the committee go round afterwards.

3758. Are they in good condition as far as ventilation and cleanliness are concerned ?—Yes ; but I would rather have more ventilation. My own opinion is that cowsheds should not be in London at all.

3759. What evidence is there that this disease originated in the London parishes ?—In the first place, the absence, as far as I have heard, of any undeniable proof that the disease was brought from Revel. In the second place, the inability of finding out how the infection came in about half the cases. It is difficult to prove a negative, but having failed to ascertain any mode by which the infection was brought, I think it is a fair inference to draw ; but I have no evidence.

3760. In Hackney the cowsheds are not in such a bad state as would apparently give rise to so serious a disease as this ?—I think that the mode of keeping the cows is at the root of the whole matter. They are kept in milk for 18 months or two years or longer ; they are stimulated with grains, and, as I have before stated, a long residence in the sheds shortens the coat, enfeebles the constitution, and predisposes them to disease. I do not think that the state of the cowsheds, independently of the condition of the animals, and the extremely hot weather we have had, could have originated any such disease as this.

3761. Do you suppose that such conditions as you have mentioned, and which have been in existence for a long time, and such weather as we have had, could possibly have given rise to a specific disease of this kind which is propagated by contagion ?—I am not aware that we have had any such season as the present, before. I am one of the honorary secretaries of the Meteorological Society, and I have kept a record for years, and I am not aware that we have had such an extraordinary and continuously dry hot season before ; we have had a higher temperature occasionally than we have had in this year ; but it has been a very dry year, and there has been a most unusual continuance of high temperature.

3762. That would apply, would it not, to the latter months of the summer ?—Yes.

3763. The disease appeared in England in the middle of June ?—It is said so ; but I had not seen any cases in Hackney in the middle of June.

3764. Nevertheless it was in England on the 24th of that month before the operation of the causes you have alluded to ?—If it existed in England on the 24th of June of course it would affect very considerably any opinion of that kind.

3765. You have referred to cases in which the disease apparently originated spontaneously ?—Yes.

3766. Were there any examples of several simultaneous outbreaks in your district ?—At first we were pretty free. I do not think it appeared severely until about the 8th or 10th of August, and then we had an outbreak almost over the whole district.

3767. In every cowshed ?—No. I think that out of the 82 cowsheds about one fourth had become affected within a very brief time, and subsequently to that the majority became affected.

3768. In some of those cases you could trace the entrance of the contagion, and in others you could not ?—Yes ; some of the first cases appeared in cattle which came from the Metropolitan Cattle Market ; nearly one half of the outbreak occurred in the cattle which had been brought into the district, and in the other half I was quite unable to ascertain any cause for it.

3769. There had been no fresh cattle introduced ?—Yes ; there were some extra. In one shed a bull first took the disease, and it spread then to the cows. No fresh cows had been introduced ; but there was a thoroughfare, with a louvre board opening to it close to the cowsheds, and the bull was next to the louvre board, and in that instance, I think, the infection must have been taken through the louvre board, next to which the bull stood.

3770. Does not that case rather shake your notion that the contagion was not introduced into the district ?—No ; in some cases the sheds were so isolated, and I could not ascertain any mode by which the disease could have been introduced ; but a person might have visited a shed who had previously been in another shed that was infected. In one case I was informed that the owner had not bought any fresh cattle for six or seven weeks, and more than that, in another instance, in which it broke out. I was assured that no stranger had been there, and in the first-mentioned case the shed was nearly 100 yards from any thoroughfare.

3771. I understood you to say that a great number of the cattle that were killed were probably sold for food ?—Yes.

3772. Have you traced any injurious effects on the public health from the consumption of that meat ?—No.

3773. Not a single instance in which any disease has been attributed to it ?—No ; and I may say that I would not hesitate to eat the meat, if the animal had been killed in the earliest stage.

3774. All parts of an animal ; the tripe as well as the muscles ?—No ; but I would not hesitate to eat any of the prime parts. I knew an instance in which a fine beast had been condemned by a veterinary surgeon ; two inspectors of markets subsequently examined it, and stated that it was sound. I am informed that twelve butchers dined off a sirloin from that beast, and that they were none the worse for it.

3775. Are there any signs by which meat taken from a diseased animal can be detected ?—None, in the first stage.

3776. Is there nothing in the colour of the meat to indicate it ?—It is a little darker in the advanced, but not in the early stage.

3777. (*Dr. Playfair.*) If I understand your evidence correctly, you would have, as an improvement upon the present Orders in Council, sanatoria established, and have ambulances provided for the removal of cattle in all the towns of the kingdom ?—I did not say that. I would try sanatoria, for the purpose of ascertaining the best mode of treatment.

3778. In all the towns of the kingdom ?—No. I would first have one or two in London, and I would then ascertain the rate of mortality in the sanatoria, and whether or not it would be advisable to extend them to other parts of the kingdom.

3779. In the meantime would you go on with the present Orders in Council as to slaughtering in the rest of the kingdom ?—Wherever the disease broke out for the first time, I would ; but if a large number of animals were infected in a district I would separate the sound from the unsound. In the event of there being only one or two diseased, I would take them out, slaughter them, and disinfect the shed and healthy cattle. If there was a large number diseased I would remove the healthy, after disinfecting their coats, to some isolated place.

3780. You would separate the diseased cattle from the healthy cattle, and treat them ?—Yes ; where it had broken out to any extent ; but where it appeared

for the first time I would slaughter the infected cattle, unless the number infected was large.

3781. In what time do you think you would obtain useful experience from sanatoria?—I think that in the course of a month, with a sanatorium on a large scale, you would be justified in pointing out to cowkeepers a mode of treatment; and this is the more desirable, as cowkeepers believe that veterinary surgeons have not studied the diseases of cows, and consequently will not employ surgeons. I think you would be able to point out, not a specific, but a general plan of treatment.

3782. Does the history of medicine afford us much encouragement for hoping that a severe plague of this kind may be treated in a curative way?—I think that the history of typhus and of typhoid fever in man certainly affords great encouragement with regard to removing diseased cattle from the localities in which the disease breaks out, sanitary measures being afterwards used to prevent the spread of the disease. I think that taking the cattle away, without disinfecting the coats of the animals, would not do. They should be disinfected by washing their coats with three ounces of chloride of lime to a gallon of water, and by using, two or three times a day, chloride of lime in the sheds, by taking away the manure, and, in fact, generally adopting proper sanitary measures in the sheds. I think the two must be combined, and I do not think that the one without the other would do it.

3783. You approve generally of sanitary measures?—Yes.

3784. In the history of cholera has medical science discovered any great curative remedy in the 40 years during which that disease has been studied?—I have been sanitary officer during two epidemics of cholera, and I observed that the moment sanitary measures, such as those which I advise at present, were put into force, the disease from that time decreased.

3785. We probably all agree that hygienic and sanitary measures are of the first importance; but the question now is, whether we should wait, before vigorously acting in the country, for any experience which the medical men may gain as to a specific cure for the disease?—I can only repeat what I have before stated, that I would try immediately to stamp out the disease where it first appeared in a district; but I would not carry out that system where the disease had spread extensively. When the cholera came you had a far larger proportion of cures in the latter part of the epidemic than in the first.

3786. And you may expect that now?—Yes.

3787. In the several centuries in which the attention of medical men was directed to the human plague, was much information obtained as to curative measures?—Not much; the great cure for the plague in the metropolis seems to have been the Fire of London.

3788. And hygienic measures?—Yes, afterwards.

3789. As far as I understand your evidence, you believe that this disease might be best combated by putting in practice hygienic measures on a large scale?—Yes.

3790. More by that means, perhaps, than by any direct specific cure?—I do not believe that there is any specific cure; but I think that from the condition of the blood the treatment most likely to be successful would be a system of chlorates or nitrates, or medicines of that kind. I think that they would be more likely to be successful than large doses of stimulants.

3791. Have you any hope that we might attain the same advantage by improving the hygienic condition of the cattle as we did in the case of the human plague, so that the disease shall not fix itself in this country?—I think not; I speak, however, without proof. The disease spreads in the open fields and in the best kept sheds, in about the same proportion as in the filthy and ill-kept ones.

3792. Was not that exactly the history of the human plague when it first visited this country, and did it not penetrate into the best-conditioned places as well as the worst?—Yes; but not in the same proportion.

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3793. And when hygienic measures were put in force, it failed to fix itself in the country?—Quite so.

3794. Is it not, therefore, possible, by resorting to hygienic measures, to attain the same conditions with regard to the cattle, and so prevent the Rinderpest from fixing itself in the country, as in the case of the human plague?—I believe that hygienic measures would be of great service, by improving the general health of the cattle; for the history, as far as I can ascertain it, has been, that the weakly cattle have suffered most; those with the short coats that I have before described, which had been kept for a long time upon grains, were those which suffered most severely, and therefore hygienic measures, by improving their general health, would undoubtedly be a benefit, but the disease has spread in Hackney as rapidly in a field as in the cowsheds. I do not, therefore, hope so much from hygienic measures in the open country as in the cowsheds of London.

3795. You are aware that in 1745 the disease spread in the cowsheds of London, as it has done in 1865?—Yes.

3796. Do you think that if you improve the condition of the London cowsheds, where this disease has appeared, there will be less chance of its spreading to other parts of the country?—To a certain extent only. My own feeling is clearly against having cowhouses or slaughter-houses in the metropolis.

3797. (*Chairman.*) Do you consider that the establishment of sanatoria will be sufficient to eradicate the disease from the country?—I do not know; but I think that the great object of establishing sanatoria is to obtain information as to the best mode of treating the disease.

3798. You would, I presume, recommend some sanitary police measures, in order to prevent the spread of the infection?—Yes.

3799. You said something as to the burial of carcases in the metropolis, and I think you stated that the present mode was inefficient; what suggestion have you to make as to the mode of dealing with the carcases of animals which have died of the disease?—I would remove the carcases in ambulances, using proper disinfectants, to some places where they could be destroyed, and where they could be converted into useful substances, made into blood manure, for instance.

3800. Could that, do you think, be done without spreading disease along the road over which they were taken?—I believe that the disease would be less spread in that way, proper disinfectants being used, than by the present slovenly mode of moving them in knackers' carts.

3801. Evidence has been given as to slaughtering all animals that come to the market, and not allowing any of them to leave it alive. Do you believe that that system could be carried out as long as there are private slaughter-houses in the metropolis?—No. I think also that that plan is not advisable, unless cattle came from an infected district. I think that the effect of it would be that you would drive all the cattle from London, and have more meat sent up to the market unfit for use. I believe that you would get a larger proportion of diseased dead meat sent to the market than you have now.

3802. You believe that diseased animals would be killed; that the diseased meat would be sent up to the market, and that you could not detect it?—Yes; there are no means of detecting it, except at quite the last stage; then the meat becomes dark, and it will not keep.

3803. If foreign cattle were to come to London only to be slaughtered, could you make sure that they were not sent afterwards alive into the country without prohibiting the private slaughter-houses?—I do not see how that is to be carried out. If you allow the cattle to be removed from the market to be slaughtered in the London slaughter houses, you

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will have no guarantee that, instead of being slaughtered, they would not be taken elsewhere. There is also another objection, viz., by ordering foreign cattle to be slaughtered you would stop importation, because if the cattle were to be sold with a knowledge that they must be slaughtered immediately they would fetch so low a price that no cattle dealer would send them.

3804. Would that be the case if the order was applied universally over Great Britain ?—I think so.

3805. Is it your opinion that the spread of the disease throughout England is to be attributed in a great measure to the fairs and markets which have been held in the different towns ?—Yes. I think that the disease has been spread throughout the country from London as a focus. At the same time, I think it was spread before the city authorities knew that the Cattle Plague was in existence here.

3806. (*Mr. Read.*) Do you not now get bad dead meat from the country to London ?—A good deal.

3807. If you allowed cattle to be moved from the market to private slaughter-houses without any check, would not those cattle, to a very large extent, get into the country, and not be slaughtered here ?—If they did part would come back as dead meat.

3808. Would it not be possible to make it penal for any person to convey cattle out of London ?—The question is, who is to carry out such a law.

3809. If you made every policeman an informer could not such a rule be carried out ?—There are already orders against moving diseased cattle, or healthy cattle from infected sheds; but there are not sufficient inspectors to watch the sheds, and to prosecute afterwards. The police do not seem to be the proper persons to put such orders in force.

3810. Then the Orders in Council are inoperative because no one is authorized to carry them out ?—They are partly inoperative for that reason. I think that you should have a sufficient staff to take down the number of the cows in a cowshed, and then if one was missing, the inspector should enquire what had become of it. You would have some hold upon them in that way, and a constant system of inspection is the only way of ascertaining what has become of the cattle.

3811. Would it not be much easier, if it were made penal to drive cattle from the metropolis into the provinces, to detect it ?—The question is, what is London. The metropolitan district is so very extensive, that the law would be easily evaded by moving cattle a little outside of the boundary, and then driving them in a cross direction, as if they were coming from some other place, and not from London. A large proportion of the 596 animals removed in Hackney were, I believe, removed without an order from an inspector, and there has not been one single conviction for so doing. This I think shows the extent to which the orders are habitually evaded, and the difficulty there is of carrying them out.

3812. Do you suppose that this disease is the Rinderpest ?—Not having seen the Rinderpest, I cannot give you any opinion.

3813. Have you not read the history of it as it has appeared in foreign countries ?—I have read in the newspapers the letters which have come from some of the professors.

3814. Have you read any accounts of the treatment it has received from scientific men abroad ?—No, except what has appeared in the newspapers.

3815. Nor that all treatments have generally failed ?—I know that fact; but I do not see, because they have failed elsewhere, that that is any reason why one or two sanatoria should not be established; and if you prove in England that the disease is absolutely incurable, and that it cannot be treated, you will then satisfy people.

3816. Can you suggest any sanitary measures for the treatment of the animals which are now in the Norfolk pastures and marshes ?—No; that is just the point. I cannot see any mode of sanitary treatment for animals in fields and marshes.

3817. Do you know that the mortality is as great there as anywhere else ?—Yes; but my evidence has reference chiefly to the London districts, and I think that in a city like London a different system requires to be established.

3818. In the case in which you stated there was a difficulty of breathing, but no running at the nose, had the animals other signs of the disease ?—I cannot answer that question. I merely just put my ear to the animals.

3819. You probably know that running at the nose and eyes is not the first symptom ?—Yes.

3820. Most frequently a farmer would discover that a bullock was ill a long time before he observed those symptoms ?—No doubt; it is, however, one of the difficulties, that animals may be ill from cold and other causes, and yet have the symptoms which are described as being the premonitors of Rinderpest, so that we want, if possible, to discover some peculiar symptoms which would enable cow-keepers to distinguish Rinderpest in an early stage. I think that a practised eye would be able to see somethink about an animal, he could not tell exactly what, which would enable him to say that the animal had got Rinderpest, while at the same time another eye would pass it over.

3821. Farmers might see it sooner by such symptoms than you could detect it in the breathing ?—Quite so, and perhaps sooner that way; but shortness of breath is not a symptom peculiar to Rinderpest.

3822. (*Chairman.*) You have stated that you do not consider the present Government measures sufficient. What measures would you suggest for stamping out the disease in the country, besides providing sanatoria ?—I would appoint, in any district where the disease appeared, a person whose whole business it should be to inspect the locality, and of course, if he went from shed to shed, that he should use proper precautions to prevent his clothes becoming infected, so that he should not carry the disease away with him. I would follow out the Government system in that way in any district where the disease appeared.

3823. Do you believe there is a sufficient number of competent veterinary surgeons in the country to carry out thoroughly and properly the Government regulations ?—No; besides which I think that the veterinary inspectors are not quite the right people to do it, because, as a rule, they have nothing to do with cow diseases. The first Government inspector was appointed for my district and the adjoining one; there was one inspector to 5,000 acres, and he could not carry out such a plan as this in consequence of the size of the district and the number of cattle.

3824. Who would be the proper inspectors to carry out the regulations, amended as you would desire to see them ?—My plan would be to educate a certain number of cow-leeches in the sanatoria. In a few days they would learn to detect the early symptoms.

3825. Is it not rather late to do that ?—I think it is rather late now to do it.

3826. (*To Dr. Aldis.*) Will you state what position you hold. I am a Doctor of Medicine of Cambridge, a Fellow of the Royal College of Physicians of London, and Medical Officer of Health for St. George's, Hanover Square. I am not prepared to give evidence. I came merely to attend with the deputation. I attended at the Privy Council Office on a former occasion with the Lord Mayor, and Mr. Gibbins, and a deputation, to support the principle of sanatoria, and also to suggest the propriety of a Commission of this kind being appointed; and Lord Granville stated that it was then in contemplation to appoint a Commission. I may state that many persons have expressed their regret that such a Commission was not appointed at an earlier period, and that instead of receiving information first hand, which might have been obtained if an earlier Commission had been appointed, you should now have to rest upon information obtained second-hand. We

should then have been prepared. There would have been more self-reliance in the country, and we should have had more data to go upon. I have taken great interest in the progress of the disease, and I reported upon an outbreak that occurred at Eltham in Kent. The report appeared in the "Times" of September the 14th last. I there observed, and it was so reported, that out of the first 45 animals that were attacked 14 recovered, without any of them undergoing any treatment. At the same time others died which had been put under treatment; but they were treated by a gentleman, who, I understood, was not a member of any veterinary college, but he was a gentleman who practised as a veterinary surgeon. Seeing that 14 out of the 45 attacked recovered without any treatment, it struck me that with judicious treatment more might be recovered, if properly managed. Some observations have been made by the preceding witness, Dr. Tripe, with regard to the breaking out of the disease without contagion. I think I have had some evidence upon this point in my own district, and I have made further inquiry about it this morning in the case of Mr. Prett, a cowkeeper, who had only eight cows. One sickened, which he had sent to market. It was seized there, and was not allowed to return, because it was alleged that it had the disease. He sold the remaining number. I saw his books, and it appears from them that he has had no fresh cows in his shed since March last. It seems to me that the doctrine of contagion has been overdrawn in this country, like it always has been whenever any epidemic has shown itself; the same thing occurred when the cholera broke out; it was alleged that it was contagious, and a panic was created as to the cholera, a number of persons believing that it was extremely contagious; but that doctrine was proved to be utterly fallacious. I can assure the Commission, if I may refer so far back, that I was brought up in the school of contagion, so much so that fever was said by a learned professor to have existed in a certain house, which was whitewashed, and everything done to purify it; but the fever returned, which could not be accounted for, until a Latin grammar found in a cupboard was said to be the cause of the reproduction of the fever; it was so stated, and it is now well remembered by some of my colleagues. I afterwards went to another school, to St. George's Hospital, where Dr. Chambers practised for several years, and taught quite opposite doctrines; he stated that he had never seen typhus or typhoid fever spread in the hospital; there were two that joined then, and the older one was the worst ventilated hospital in London, but the situation was so good that he attributed to that the fact of the disease not spreading to the other patients, whereas in other hospitals it did spread, especially in those that were near to the river. He argued that the physicians and the nurses that lived in the locality were probably predisposed to the disease. My own opinion is, that the doctrine of contagion has been over estimated in the Cattle Plague, and I also believe that in this case of Mr. Prett there may have been a miasm in the air, and not only in that case but in several other instances this miasm may have produced, irrespectively of contagion, the disease. I observed the disease in my own district; there was a case where the symptoms were evidently pulmonary; there was a shortness of breath, and difficulty of breathing, and a running at the nose. The same symptoms occurred in all that I saw, or at all events in a good many of them that I saw. At Eltham the symptoms were principally of that character. I attributed the disease then, after making a post-mortem examination, principally to bronchial congestion, which was found to a great extent. I formed this opinion from the quantity of frothy mucus. I never saw so much in my life in the trachea. The bronchial symptoms might, no doubt, have been detected in a very early stage by auscultation. From what I saw of the disease I should be disposed to call it catarrhal fever, but others have found the mucous membrance of the bowels either congested or ulcerated. I detected much softening in the lining membrane of the third stomach. The term "typhus" gives us too much the idea of contagion, but I will refer to the derivation of that word. We derive it from a Greek word meaning stupor, and in none of these animals which I have seen have I observed stupor. I suppose they mean that there is a lowness or dulness in the animals. The animals which I saw were lying down, and they were dull and heavy; but there was nothing like the stupor or prostration of typhus or typhoid fever about them. An animal which I examined at Eltham got up, and walked about, and seemed shy, and it ran into a corner, and died in half an hour afterwards; and such symptoms I consider were very different from those of typhus or typhoid fever. The term appears to me to be totally inapplicable to the disease, and calculated greatly to mislead us. The term "low fever" one can understand better than typhus; but certain terms are applied which cause more difficulty than can be imagined. I may state that I had occasion to examine Mr. Cross's establishment in Old Ford. The case came before the magistrates at Worship Street. In that case I was asked to examine a diseased cow, but no disease could be found; and they told me that lately not more than one in four which had been slaughtered was diseased, so great was the panic created by the idea of its being of an extremely infectious nature. Dr. Tripe has stated that he was unable to explain what became of the animals after they were sent to the slaughter-house, but I have taken particular care to ascertain what has become of them, in one case, and I am able to state that they have been boiled. A first skimming was taken off, which became quite white without any smell. Two skimmings were taken off; the first was very white, and looked very pure, and to my great surprise, and I must say disgust, a man on the premises drank some of the liquor from the boiled meat, and tasted the skimmed fat. I was cross-examined upon this point, the object of the question being to know whether he did not make a wry face at it, and I said no, that he really smacked his lips at it, in the presence of Mr. Clarke. I do not think that Mr. Cross was present.

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3827. Was this skimming the result of boiling a diseased animal?—Yes; but whether they are healthy or diseased, it comes up; they were boiling then the healthy and the unhealthy, and the proportion of the diseased was one in four. Very strong sulphuric acid was poured over the meat, which became black, and was used for manure; there was no particular smell from it, except that of the acid, and it was rather refreshing than otherwise; there was nothing like putridity about it. The first skimming was very white, and it was sold to be mixed with soap, and I should not wonder to hear, if a cow were washed with it, to that would be attributed the contagion. This soap is made up, and sold. The second skimming was of a yellowish character, and I believe it was converted into soap. In my own district, in Mr. Hatt's yard, 12 only remained out of 103, and one of those only was diseased, but they had been condemned the day before I saw them. Mr. Dexter also lost nearly all his cows; there remain only two in his shed. A cow died in my district, and I was called up at night respecting its removal. The drover was so alarmed that he ran away, and the police did not know what to do with it. It remained there, and was not taken away till the next day. That was in Effingham Street; there were 100 people round it. It is very difficult to arrive at any conclusion as to the actual commencement of this disease in sheds, because there has been so much concealment practised on the part of cowkeepers that it is almost impossible to give any precise data as to the time of its origin in London. I do not think I need detain the Commissioners any further.

3828. Do you think that any preventive measures

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should be taken to prevent the spread of the mortality in the country?—I think that there should be preventive measures taken.

3829. (*To Dr. Whitmore.*) What district do you represent?—I represent the district of St. Marylebone; and I may state that in that district the disease has been very severe. We have lost out of 1,300 cows a considerable number, something like 1,000 and of this number 300 have died with the disease, and the others have either been slaughtered from being slightly attacked with it, or have been sent away and sold for the purpose of avoiding the disease. I may state decidedly my opinion of the desirability of establishing a sanatorium for the purpose of obtaining information with regard to the treatment and pathology of the disease. I cannot apprehend that any very material good can immediately result from it, but inasmuch as we do know that a very virulent disease, the small-pox, decimated this country for many years, and that at last a remedy was found for it, we may hope that something may be discovered by which the fatal nature of this cattle disease may also be arrested. I may state that as the result of very considerable trouble which I have taken to ascertain the origin of this disease, I have come to the conclusion that it is an imported disease. I had reason to think with Dr. Tripe from the information which I obtained amongst the cowkeepers in my own district, that it did break out in the cowsheds, but I was not satisfied with the information which they gave me. There was hesitation and prevarication about it, and many indications to my mind that they knew more than they were at first disposed to tell. I have pursued my investigations further, and I have come to the conclusion that in almost every doubtful case that has come under my own knowledge I have been able to trace the origin of this disease, and I have traced it in many cases to the cattle market, even where the animals were said to have come from the country. Mr. Drewell, who owns a shed in Beaumont Mews, informed me that the disease broke out in his shed about the middle of July, and he stated that it could not possibly have come from the cattle market because it was brought to his shed by a cow which he had purchased at Edmonton. This cow had been supposed to be a very healthy cow indeed, and it was said to have come from some district further in the country, and from circumstances he satisfied himself that the disease did not come from the cattle market. However, by prosecuting inquiries, it was found that the cow which he had bought had actually come three or four days before from the cattle market, and from amongst diseased cattle. If the Commission wished it I could quote some other instances almost parallel to that, and therefore I have come to the conclusion in my own mind that it is an imported disease, and I am strong in that opinion from the fact that if we have it now why did not we have it 10 or 15 or 20 years ago. Why should it have come upon us almost as a new disease? That is the opinion which I have arrived at. With regard to its being a typhoid disease I have seen some post-mortem examinations of animals which have died with this disease, and I have seen them in various stages of the disease, and I have seen an absence of some of those post-mortem appearances which indicate typhoid disease in the human subject. I mean the want of that ulceration of a peculiar gland which is known as the Peyer's gland. In any of the dissections that I have witnessed I have never seen those glands in the state of disease in which they appear in the human subject, whilst on the contrary in healthy cattle at the slaughter-house of one of the best slaughterers in London, Mr. Way of Wigmore Street, I have seen a chronic diseased condition of those Peyer's glands, where the meat has been undoubtedly very good, that condition probably arising from disease in the animal in its early life; but I have always seen an absence of this symptom in the Rinderpest, although I believe every case has shown decided and continuous inflammation, to a greater or lesser extent, throughout the whole of the alimentary canal, from the mouth to the anus. Perhaps I may be allowed to add that it has been urged that there has been no marked symptom to characterize this disease from most others, but I have noticed one (and indeed it is not my own first suggestion), and that is the early inflammation of the organs of generation. The vagina of the cow invariably in the first symptoms of the disease is one of the first parts of the animal which appears to be affected; there is a blush of inflammation there before you find it anywhere else. I have very little further to say to the Commission. I have examined several animals that have been slaughtered, and, as far as my observation has extended, I should speak of it as a disease in the first instance affecting the whole of the mucous surfaces of the animal.

3830. Do you think the measures which have been adopted by the Government are sufficient, or do you think that additional measures of prevention should be taken?—I think that the most stringent measures should be taken to prevent the spread of infection. I would resort to the same measures as are resorted to on the continent in Prussia and Austria. I would isolate all the herds that are affected, so confident am I of the powerful character of the contagion; and with regard to the powerful character of the contagion, I may observe that in some seasons diseases become epidemic which are not so at other seasons; at one time you will have the disease sporadic and at another epidemic, and that will depend upon causes which of course we know nothing about.

3831. (*To Dr. Sarvis.*) What position do you hold?—I am an M.D. of Aberdeen, a Member of the Royal College of Surgeons of London, and medical officer of health for the Bethnal Green district. It might be as well for me to give the Commission some hints of a practical nature on the carrying out of the Orders in Council which have nothing to do with the medical portion of the subject. We find that the Orders in Council are not carried out. Cows have been driven from the sheds to private slaughter-houses, and there killed, and sold for human food, and there has been no surveillance at all over the cowsheds. An inspector has perhaps gone in when notice has been given, and in many instances where no notice has been given at all, he has gone into the sheds, but no account has been kept of the cows, and they have not only been taken to the private slaughter-houses, but they have positively been sent into the market. I believe that the cause of the spread of the disease is by cows being taken out of sheds, in an incubative stage of the disease, and sent to the cattle market, and put amongst the healthy cattle, where they have incubated those that were healthy, and those cows have been taken away all over London and to different parts of the country, and thus have spread the disease. I can only say that directly the disease is known in a shed, I should recommend that a policeman or some person should be put in that shed, and keep watch upon the whole of the cows, and know where they go to; for if you do not do something of that kind you will have them driven off, and certainly send unhealthy food into the market, and you will send unhealthy cows also into the market, and spread the disease around. Many cows that have the disease are sent into our district to be slaughtered, as Dr. Tripe has told you was done with Mr. Strong of Hackney. We have seized a great deal of meat that has come from the other districts, and unless you look well to it I am sure the disease will go on as long as it did before.

3832. You state that you believe that the public markets have been the means of communicating the disease throughout the country. What measures would you suggest to prevent that evil?—Directly the disease was known to be in any shed, I would put somebody to watch to prevent any animals being taken from that shed. First of all you might get it at the market; but it must be taken to the market from somewhere. How has it got there, and how

does it get there? No doubt it was imported from Russia in the first instance; it then spread to the cowsheds, and it has been taken backwards and forwards to the market. The only way in which you can prevent the extension of the disease is, directly the disease is known, to put a person in the cowshed to keep watch over the cows to see where they do go to.

3833. You are aware that the disease has spread very considerably in England, and that from other infected districts besides the cowsheds of London infected animals may come to the Metropolitan Market; how would you check that?—I would have them examined singly before they came into the market, and not allow them to come in until they had been passed by the veterinary surgeon. I believe that the symptom which Dr. Whitmore has named, the inflammation of the vagina is the very earliest symptom that you can detect, with a general dryness of the skin.

3834. (*Chairman.*) (*To Mr. Gibbins.*) Have you any further information which you wish to give to the Commission?—I would, perhaps, just call attention to one question asked me on the last occasion when I had the honour of appearing before this Commission, namely, with regard to the number of cattle leaving the market unsold. I have that information before me, and I find that on the 2d of October there were 6,550 beasts in the market. Out of that number 4,000 were sold to be slaughtered in and round London, 1,950 were sent away to the country for that purpose, to different parts of England, and 600 remained unsold; and out of that number the owners of 492 refused to have their cattle's tails marked. On the following Thursday, October the 5th, there were 1,160 beasts in the market; 700 were sold to be slaughtered in London, and 250 were sent into the country, out of which 112 were unmarked. On Monday, October the 9th, there were 5,830 in the market, 3,500 were sold to be slaughtered in London, 1963 sent into the country, and of those 463 went away unmarked. On October the 12th there were 1,190 in the market, 650 were sold to be slaughtered in London, and 260 were sent into the country, and 126 were unmarked. Last Monday, October the 16th, there were 6,340 in the market; 4,000, as near as we could tell, were sold to be slaughtered in and round London, 1,874 went into the country, and 374 were unmarked. So that with all the care that we have taken we cannot prevent their leaving the market without the mark being upon them.

3835. (*Mr. Read.*) (*To Dr. Aldis.*) What meaning do you attach to contagion; do you mean actual contact?—No, not actual contact. I think that the idea of contagion is over estimated. It was the case when cholera first appeared in this country, or when any other epidemic disease broke out; in fact, contagion seems to be a bugbear. Cholera was thought to be exceedingly contagious, but it has been proved not to be so. I think, perhaps, that in the present disease the alarm as to contagion is overdrawn.

Dr. Sarvis.—There is one point to which I should like to call the attention of the Commission, namely, that is, in the case of cows dying in the street some immediate course of action should be adopted; our sanitary staff cannot order its immediate removal, and that has created great alarm. On one occasion when a cow in our district died in the street, the police said they had nothing to do with it at all, and the magistrate to whom application was made said that he had no jurisdiction in the matter, and the cow was left in the street for a very long period, and caused great alarm.

3836. (*Chairman.*) Had not the local officers ample power to remove it?—Yes, they had; but they must give notice in the first instance, and the delay would be too great. If it was simply treated as an obstruction in the first instance the dead animal would very soon be removed; but at present there is no power except through the order of the magistrate.

Dr. Tripe.—The order is that the Government inspectors should give notice directly to the inspector of nuisances; but a summons is very rarely returnable under a week, and certainly not under three or four days.

Dr. Sarvis.—The fear of the disease is so great that it would be well if it were treated by the police simply as an obstruction, and removed. That is a point which should not be lost sight of.

3837. (*To Dr. Tripe.*)—Are the officers of health obliged to have recourse to the magistrates to carry out orders which are resisted?—Yes, for everything. We can do nothing except by the order of the magistrates.

3838. (*Chairman.*) (*To Dr. Sarvis.*) Have you seen frequent instances of cows dropping in the streets?—No; only this one in my district.

The Deputation withdrew.

Mr. Henry Gray Brydone examined.

3839. (*Chairman.*) Where do you reside?—I live at Petworth in Sussex. I am Chairman of the Cattle Plague Association there, and agent of Lord Leconfield's estates.

3840. (*Viscount Cranborne.*) I believe that you are desirous of making some representation to the Commission concerning the turning out of cattle upon common lands?—Yes.

3841. What is your opinion as to that practice?—I think that it would be very desirable to put a stop to the turning out of cattle upon common lands.

3842. Of all cattle?—Of all horned cattle.

3843. Is it your belief that infection has spread widely in the country with which you are acquainted in consequence of that turning out of cattle?—I think it is very liable to spread in consequence of the turning out of cattle.

3844. Do you know of any instance of its having done so?—No, I cannot trace any.

3845. Have you got the disease in Sussex?—Yes, in our immediate neighbourhood. Our immediate district is tolerably free, but within five miles of Petworth, I believe, the disease exists.

3846. Is it largely developed there?—Yes; they have lost about 2,000*l.* worth of stock in our neighbourhood, and 1,000*l.* worth in another spot within five miles of Petworth.

3847. In that part of Sussex are the commons numerous?—Yes, they are numerous all over that part of the country.

3848. How was the disease introduced into that part of the country?—By calves bought in Chichester market on the 12th day of July.

3849. Is the transit of stock across the commons very frequent at this season of the year?—The transit is very frequent. The drovers generally leave the drove on the commons to refresh themselves.

3850. Do they do that at this season of the year?—Yes, at all seasons.

3851. Even in winter?—Whenever cattle are moving, they are commonly left to feed in the middle of the day near a public house, if there is a common near.

3852. Do cattle move in large bodies across Sussex on foot?—Yes, droves have been in the habit of coming to our fairs. Our fairs now are mostly stopped, but cattle is still moving about.

3853. Supposing your fairs were altogether stopped, would not the droves cease to come?—Yes, I believe they would cease. Several droves have come into our district quite lately, intended for certain fairs that have been stopped, and they have been taken in upon the different farms.

3854. But supposing that the fairs were altogether

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stopped, and the droves ceased to come, then the danger of turning out cattle upon commons would cease ?—I think that the first thing that happens when the disease shows itself is, that a man sends to market all the marketable stock on his farm ; and I think that the marketable stock that is sent off his farm immediately upon the breaking out of the disease is stock which is very likely to give the disease to any cattle that it passes through or comes in contact with.

3855. Any cattle that are sent to market because they are diseased would hardly come a sufficient distance to make it necessary to turn them out on a common for the night ?—No; they would not be on a common during the night.

3856. Do you think that danger in their case would arise from their passing through the common in the day time ?—Merely from passing through I think there would be danger, because when cattle are being driven other cattle generally run to them if it is an open place, and join them. If one set of beasts see strange beasts passing, they always run as close to them as they can.

3857. Speaking very roughly, what should you say is the average number of cattle that are turned out on commons in Sussex ?—I am afraid I could not say the number.

3858. It is the practice entirely, is it not, of small proprietors ?—Yes ; it is the practice of smallproprietors and of the owners of inferior stock.

3859. The putting a stop to that practice would not affect the rich proprietors' stock in any degree?—I think not. I think that no valuable stock would be left out upon a common.

3860. It would probably affect the owners of half-a-dozen or a dozen cattle, generally speaking ?—Yes ; the smallest farmers, and the owners of one or two cows.

3861. The commons form a large part of the country only in Dorsetshire, Hampshire, Surrey, and Sussex ; you do not know of them in any other part ?—I am not much acquainted with them, except in Sussex. My acquaintance does not go much out of Sussex.

3862. You would approve, would you not, of the fairs and markets being stopped for a limited period ?—Yes ; we have memorialized to have them stopped by the magistrates in our neighbourhood, and they have mostly been stopped till about the end of November.

3863. You think it better that they should be stopped uniformly throughout the country ?—Yes ; I think that that would be desirable.

3864. (*Mr. Read.*) How are those commons stocked; are the cattle removed at night ?—No ; it is mostly stock turned out and left to take it chance.

3865. Are they open commons ?—Yes ; they are open commons, mostly with roads through them.

3866. When would those cattle in all probability be removed ; would they be kept on the commons all the winter ?—They would not be removed till Christmas, probably, unless snow came, or very heavy frosts. There is very little stock out now, because most people are afraid to turn them out ; only very venturesome persons do it. There is a great quantity of grass on the commons now, more than the stock can eat.

3867. Generally speaking, those commons must be sources of disease on account of the commingling of all sorts of inferior stock ?—Yes ; I think so. I think that almost all the drovers stop on the commons and feed their droves ; and a number of droves have passed through our county.

3868. You have been asked whether you approve of the stoppage of fairs and markets. I believe that you limit that opinion to store cattle. You would not prohibit fat-stock markets, would you, if all the cattle that went into those markets were killed in the town?—There is very great difficulty in distinguishing between fat and lean stock ; if they could be distinguished I would not prohibit a fat market.

3869. Supposing an order were issued that all cattle that went into market should be killed in that town, would not that be a prohibition to store stock entering any market ?—Yes, I think it would.

3870. Do you think that it would be a great hardship that all the fat stock exhibited in a market should be killed in that town ?—No ; I think it would be a prudent step, and it is the course that prudent people are now following. They would not take any stock to market and bring it home again on any consideration ; but there are great difficulties in the way of killing in the town where the market is held.

3871. (*Viscount Cranborne.*) Is there any custom in your country by which the commoners have only the right to feed as many cattle on the common in summer as they can provide arable land for to keep them in the winter ?—That I believe is the general law of turning out on commons ; people are not entitled to turn out more than that number.

3872. According to that they ought not to turn them out on the common in winter at all ?—They may, I believe, by law turn as many cattle on the common in summer as they have sufficient provender for in the winter on their enclosed lands, that is the limit of the right of turning out.

3873. That assumes that they do not turn them out on the common in the winter ?—They leave them out as long as there is anything to eat on the commons.

3874. How long would there be anything to eat on the commons ?—Till December, unless severe frost and snow came ; but there would be very little stock out so late, and that of a very inferior character.

3875. The very inferior stock would belong to the poorest people. Would it be a great injury and pressure upon them if they were forbidden to depasture upon the common ?—No, I think not.

3876. Would it force them in any cases to sell their cattle ?—No, I should think not ; it might in a few individual cases ; I cannot tell how it would be in every case.

3877. Of course you must have within your personal acquaintance a considerable number of commoners of that kind ; are they generally in such circumstances that such a pressure would bear hardly upon them ?—No, not by any means generally ; there might be a very few cattle on the common that might have to be sold in consequence, but it would be a very small number of the cattle out.

3878. Are they mostly cows or beasts on the common ?—Mostly beasts ; there are very few cows.

3879. I suppose the cows would be the cases where it would press the hardest ?—Yes ; but there are very few cases of cows out. Cows would not be kept out till December, because they would give no profit if they were starved on the common in December. Cows would be the best treated, and they would be the least on the commons ; they would be taken in earlier, and turned out later.

3880. You would not care, would you, to apply the same order to sheep ?—I think it would not be necessary, and it would be very difficult. In Sussex and perhaps in other counties, the downs or common lands come within the legal definition of common land, and the flockmasters would not know what to do with their ewes, if they could not turn them on the common. There is a great opportunity for any gentleman who is willing to practise upon cattle, or try experiments, in our neighbourhood, at Midhurst, because cattle have been dying there all through August and September, and all this month ; and anybody who could offer any receipt, and stay by and follow it out, would get the thanks of the owners of the cattle.

3881. (*Mr. Read.*) Where did the calves that were bought at Chichester market come from ?—I have not followed them ; but the circumstances were very remarkable, and indeed unusually remarkable, about the calves from Chichester market. One I think was a particular case of a man named Puttick ordering a calf to be bought for him at Chichester market, and countermanding it on the evening of the

market day, and the person who bought it for him sold it to a man named Shotter, and the man named Shotter has lost about 20 head of cattle, the disease being taken by them from that calf. One of Lord Leconfield's tenants about five miles in a different direction also got some calves at Chichester market on that day, and he has lost 40 head. I believe that those calves were from London, but I have not inquired into the point so as to be certain.

3882. (*Viscount Cranborne.*) Supposing there were an order passed prohibiting the depasturing of cattle on commons, do you think that the local authorities would be able to enforce it?—There was a recommendation I believe, or something to that effect, in the beginning of August, when I was abroad, and therefore I do not know the particulars of it; but it recommended that cattle should not be depastured on commons, and in consequence of that recommendation very little stock has been depastured on commons, and for a long time nothing whatever was turned out. All August there were no cattle turned on commons in our part of Sussex, and even now many people do not even turn out cattle, under the impression that that recommendation has been given and ought to be followed, although it is not legally binding. I think, therefore, that any Order in Council would be generally obeyed, because it would go along with the general feeling.

3883. What penalty would you suggest? Would you propose that the cattle should be impounded?—No; it would be better to take proceedings against the owners before the magistrates. I believe that an Order in Council would be effective. I believe that it would be obeyed. Perhaps I may be allowed to state that we have a square district of 60,000 acres, and we have 50,000*l.* worth of stock insured in the association. The disease is active in the Arundel district, which joins us, and in the Midhurst district, which joins us, but there is no disease in our district.

3884. How have you prevented it extending to your district?—Happily it broke out in the first instance in our district on large farms where they had a great deal of stock at stake; and they isolated their stock, and so prevented the sweeping of their farms, and their farms defended their neighbours. At Midhurst it has unfortunately spread almost from field to field, but it has not gone much further than 2¼ miles in 10 weeks, which leads me to the belief that it might be put a stop to by isolation.

3885. (*Chairman.*) Do you believe that a system of isolation could be carried out pretty generally throughout England?—I think it could. The "Times" recommends, to-day, the killing of all stock at home if they are to be moved at all; that would be the strongest step and probably the best.

3886. (*Viscount Cranborne.*) That would rather interfere with the supply of meat, would it not, to the large towns?—A fat beast walks very slowly to market; it goes at the rate of about five miles a day or fourteen miles in three days, and then he drops down several times on the road; and if you want to send lambs several miles you put them in carts; so that you could carry those cattle dead in a shorter time than they could be driven from the market.

3887. You are rather badly off for railways in your county, are you not?—Somewhat; but there is a station within two miles of Petworth town.

3888. (*Chairman.*) You do not think that there would be great inconvenience caused if all the trade of the country were carried on by sending to market dead meat instead of live stock?—It would be a very great inconvenience; but the question is, to balance the inconvenience against the loss of the cattle of the country.

3889. You personally would not object to any regulation of that sort?—No, I would not object; it is a regulation which our society have proposed to establish in the event of the disease breaking out in our district. We propose in that event to say to the farmer of the particular farm, "You shall not move "one beast off your farm without the leave of our "inspector, whether it has been in the same herd "with the diseased cattle or not."

3890. (*Mr. Read.*) Is not that the Order in Council, independently of your society's orders?—Possibly it may be so.

3891. (*Mr. M'Clean.*) Then you consider a mutual assurance a beneficial thing, as you look after each other?—We have appointed an inspector, and we intend to make him work; we hope that he will help the Government inspectors, because, though very thankful for their services, we think that they are very busy with their ordinary affairs, and they will not devote all their time to the Cattle Plague.

3892. (*Viscount Cranborne.*) The stoppage of fairs and markets would not, as I understand you, stop the spread of disease at Midhurst, where it travels at the rate of two miles and a half in 10 weeks?—It has travelled about two miles in 10 weeks.

3893. It spread from field to field, totally independent of any traffic from fairs and markets?—Yes.

3894. So that without some measures of isolation that vehicle of spreading the disease could not be stopped?—No; it might, I think, have been stopped by driving away all the cattle that were within a quarter of a mile at the first outbreak. The stock are now dying within a quarter of a mile of the first outbreak in that neighbourhood, but it has not travelled into the Petworth district, owing mainly to the spot of the first outbreak being surrounded by sandy commons which can keep no cattle whatever, and wood lands, to the circumstance of its natural isolation I attribute the fact of the disease not finding its way into the Petworth district.

3895. (*Mr. Read.*) The disease would spread more quickly through a small farm than a large one?—Yes; and small farmers are unable to do anything, unless somebody comes to help them, and takes their cattle away to a great distance.

3896. (*Viscount Cranborne.*) Who introduced the two sickly calves from Chichester market. Was it a small farmer or a large one?—They were not known to be sickly at the time; the calves were bought in Chichester market as healthy calves for suckling purposes, and they had no idea that they were sickly; they were bought by Mr. James Challen of Heyshot and Mr. Shotter of Stopham.

3897. Is there anything else that you desire to mention to the Commissioners?—I might state that in the Heyshot district some cows have got through the disease, and are now alive and well.

3898. What per-centage have recovered?—In one case, I believe, four out of ten that were attacked have recovered.

3899. By any particular treatment?—I do not know the treatment, but the owner was a man of considerable intelligence and education.

3900. Have you any experience of Government inspectors in your district?—There is one Government inspector appointed for our district.

3901. Is he a veterinary surgeon?—Yes, he is a veterinary surgeon.

3902. Have you any local inspectors of your own?—We have one, but he has had very little to do at present.

3903. I mean appointed by the magistrates?—The Government inspector was of course appointed by the magistrates, by the petty sessions, which is the common mode of appointing inspectors.

3904. Do you imagine that the inspectors generally in Sussex are veterinary surgeons?—Yes, in two districts there are veterinary surgeons; but at Midhurst a farmer was appointed, owing to there being no veterinary surgeon there.

3905. Has this farmer all the powers conferred by the Order in Council of killing cattle, and so forth?—I believe he has; but he believes in the curability of the disease, and he does not kill much; and I think our veterinary surgeons do not kill much; they believe in the curability of the disease, and they will not kill; they say, isolate, and do the best you can.

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3906. I presume that isolation is easier in your country than in most, the population being sparser ?—Yes, the population is sparse. I think that the Cattle Plague associations may do a great deal of good in some cases by assisting their members to isolate; a man cannot isolate without some assistance. I have isolated some stock out of a very bad district on the top of the downs, but I could not have done that if I had not had some influence.

3907. (*Chairman.*) Would you state how you did it ?—The cattle were on a farm, and cattle were dying of the disease on the two adjoining farms, and were being buried within 350 yards. This stock was driven across the farm on which there had been no disease on to the adjoining downs, through a wood, on to a lonely farmyard where there are no cattle near, and there they have been left for rather more than three weeks, and they are perfectly well. The two cows on the lone farm that they were driven to have since been condemned for Cattle Plague, and are both dead, but the stock which I mentioned was not put in contact with those two cows.

3908. How do you account for that ?—I doubt whether the two cows died from the plague.

3909. You believe that if those animals had been left between these farms where the plague was raging they would have died ?—I think the probability was very great, owing to the disease being very active in that immediate neighbourhood, within less than 500 yards of them.

3910. Did they have to go through any part of the infected farm on the road to this isolated place ?—They had no disease on the farm on which they were, and they were driven from that farm across the open downs. It was an attempt to try the experiment of isolation.

3911. (*Viscount Cranborne.*) I presume that your proposal for preventing depasturing on downs and commons could never apply to preventing the passage of any stock that might wish to go across ?—No; not preventing their passage. I should not wish it; but it would be very desirable that people should keep stock on the main high road, and not go through bye ways.

3912. (*Chairman.*) Is it the habit in Sussex to let out the sides of the road for the pasturing of cattle ?—It is used for the pasturage of cattle when it is connected with the common, so as to constitute, in fact, part of the common, but only, I think, in those cases.

3913. In some cases, in parts of the country, do not the parish authorities let out the pasturage by the side of the road to people to graze cattle upon ?—I think that that is not done in our neighbourhood.

The witness withdrew.

Mr. James Taylor examined.

Mr. J. Taylor.

3914. (*Mr. Read.*) You are inspector, I believe, at the port of Harwich ?—Yes.

3915. How long have you been there ?—About eight months.

3916. Are you a member of the Royal Veterinary College ?—Yes.

3917. Would you state to the Commission the general health of the cattle that are imported ?—The cattle which come to Harwich are particularly healthy, and also in the neighbouring districts round Harwich. We have never had but two cases amongst the Dutch cattle.

3918. Where do your cattle come from ?—From Rotterdam and Antwerp.

3919. Is not the Rinderpest now very prevalent in Holland ?—Yes, I believe it is.

3920. Still you have had no cases amongst your imports ?—Only two.

3921. How did you treat those two cases ?—They were slaughtered.

3922. What became of the rest of the cargo ?—They were detained, and most of them slaughtered by the owners to suit their convenience, the carcases being inspected before delivery; the remainder were released after 14 days' quarantine.

3923. What sort of accommodation have you for slaughtering cattle at Harwich ?—Very good.

3924. How many could you slaughter there in a day ?—About 30.

3925. Do cattle ever disembark at Harwich in the night ?—Yes.

3926. What sort of examination do you give those stock on their landing ?—A very careful one.

3927. Could you detail to the Commission how you examine them ?—All the beasts, if they arrive in the night, are tied up on the wharf by a head rope, or taken to the lairs, and the next morning I proceed to examine them.

3928. How do you examine them ?—I have two men to assist me, and I carefully examine the mouth and likewise the hind part.

3929. Do you open their mouths ?—Yes; of every bullock.

3930. What do your imports into Harwich average weekly, now ?—About 200 oxen, I should think, and 300 calves.

3931. And how many sheep ?—4,000 or 5,000.

3932. Where do they go ?—To the London market.

3933. Have you not a sale for store foreign stock at Harwich ?—No; not at the present time.

3934. You have had till recently, have you not ?—Yes.

3935. How long has that been abandoned ?—About a fortnight or three weeks, I think.

3936. For what reason ?—Because we could not get any one to buy the things. We have never had many cattle there; only a few fat hogs.

3937. I thought that certain numbers of foreign cattle were sold at Harwich by auction almost every week ?—Very few; perhaps four or five; but they principally come from the neighbouring district, from the farmers round about Dovercourt and that direction.

3938. Have you seen cases of Rinderpest besides those two ?—Yes.

3939. As a matter of course you would not be able to discover the presence of Rinderpest during the stage of incubation ?—No.

3940. However vigilant your inspection, if the animals were sent over here with the disease in a state of incubation, your inspection would not detect it ?—No.

3941. (*Professor Spooner.*) You state, I think, that two cases have occurred of the disease called Rinderpest ?—Yes.

3942.—Were they in the same cargo ?—No; in different cargoes.

3943. Can you name to the Commission the particular dates at which these cases occurred ?—One was last Wednesday fortnight, I think. I cannot be sure of the date, but one of the two was some long time back, as far back as August, I should think, and the other was in September.

3944. The first animal that you saw ill you selected out from the others ?—Yes.

3945. As being the subject of the disease ?—No; it appeared simply unwell, and I was not satisfied.

3946. Was the disease very virulent then; were the symptoms very marked ?—No; it was in the first stage of the disease, and it was detained, and I made a post-mortem examination, and then I saw symptoms which confirmed me.

3947. You have stated to the Commissioners that you detained the others, and that they were slaughtered; were they slaughtered immediately ?—Yes, some of them.

3948. Did you institute an examination into the carcases of those animals so slaughtered?—Yes, I did.

3949. Did you examine their stomachs and intestines?—Yes.

3950. And did you find in any one of them any symptoms of disease analagous to that which you had found in the one which was slaughtered and recognized as being affected with the disease?—Not the least; they were all perfectly healthy.

3951. And that applies also to the last case?—Yes.

3952. (*Mr. M'Clean.*) Have you a market at Harwich, or are the cattle consigned?—They are consigned to London. We have no market at Harwich now.

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3953. (*Mr. Read.*) Could you suggest any improvement in the mode of carrying on the cattle traffic with foreign countries?—No, I think not. I think that our district is principally infested with this disease from the cattle that come from London, which are brought by the butchers.

3954. Do you think that the cattle are overcrowded in the ships?—No.

3955. Are they perfectly watered and properly fed?—Yes; they are always watered and fed when they come on shore.

3956. In fact you think that the mode of carrying on the cattle traffic is very satisfactory?—Yes, I do.*

3957. (*Professor Spooner.*) I think I understood you to say that those were Dutch cattle which were so affected?—Yes.

The witness withdrew.

Adjourned to to-morrow at 12 o'clock.

Thursday, 19th October 1865.

PRESENT:

Earl Spencer.	Dr. Bence Jones.
Viscount Cranborne.	Dr. Quain.
Dr. Lyon Playfair.	Mr. M'Clean.
Mr. Read.	

EARL SPENCER IN THE CHAIR.

Mr. Robert Field examined.

Mr. R. Field.
19 Oct. 1865.

3958. (*Chairman.*) I believe that you keep a large dairy in London?—Yes; I have a large dairy. I formerly kept about 48 cows.

3959. In what part of London is your cowshed?—No. 3, Robertson Cottages, Westminster.

3960. Have you suffered much from the Cattle Plague?—Yes; I believe that mine was the first shed which was infected in this neighbourhood.

3961. Will you state when you first discovered it?—I did not discover it, to feel in any way sure about it, until a Sunday morning; but I do not know the date.†

3962. What sort of time ago is it; a month?—More than that; it must be over two months ago.

3963. You had heard of the Cattle Plague being in London before you had it in your own shed; had you not?—I had for a month or five weeks before that.

3964. How many cows did you lose?—I had 41. I had one or two affected; and I did not for a moment think that it was this new disease, as its appearance was so much like what we term pleuro-pneumonia, or lung complaint, and I treated them for pleuro-pneumonia. One cow was taken with diarrhœa, and another cow was taken quite in a different way, with constipation. I gave her castor oil and a glister, not thinking that it was this new complaint; but at the same time there is no doubt that there were the first symptoms of it.

3965. Did you call in the inspector of the district?—No.

3966. What became of the remainder of the animals?—When I found that there were several more sickening on the Sunday morning, I had a lot of them slaughtered which were not taken with the disease. I did not send them off the premises, because I had a slaughter-house in the next yard to mine.

3967. What do you believe was the cause of your cows having this disorder?—I can hardly say. I should be sorry to say anything wrong; but my impression is, that I caught it from the slaughter-house being in the next yard to mine.

3968. Were animals which were suffering under disease brought pretty constantly to this slaughter-house to be killed?—Not that I am aware of. I could not say so; but I cannot tell what animals had been taken there.

3969. Then why should this slaughter-house communicate the disease to your cows?—I cannot tell, except that it is just possible that a person might have sent a cow there to be slaughtered which had the disease; I only go by supposition.

3970. Is this slaughter-house under inspection?—I think that it has now lost its licence.

3971. Do you know why?—I think that it is on account of animals having been slaughtered which had the disease; but I do not speak positively as to whether any were slaughtered there before my cattle caught the disease.

3972. Were you particular in keeping your cowshed clean and well drained and well ventilated?—Yes; I think that I passed most satisfactorily on every inspection which was made of my premises. The district inspector was on my premises only three or four days ago, and he said that he never saw cleaner sheds in his life. I used chloride of lime for five weeks before the disease broke out.

3973. Have you purchased any cows since you lost these?—No.

3974. Do you consider the Government regulations with regard to inspecting the cowsheds satisfactory?—I think so; I think that it is to a man's own benefit to keep his sheds as clean as possible, and we have the inspectors frequently coming and examining them. I never had a complaint made on their inspecting mine. I have always trapped my drains, and have kept them lime-washed out four times in a year.

3975. But I suppose that there are some sheds, and probably a good many, not in so clean a state as yours?—I should be sorry to speak disrespectfully of my neighbours.

3976. Have you any remarks to make upon the Orders of the Privy Council with regard to diseased animals in the metropolis?—No. We find that this disease has taken them in the country as well as in London. I have had an idea that a little way out in the country would be better for cows than for them to be in London, and I have taken a farm over at Wimbledon, but owing to my losing all my

* *See* Appendix B.

† The witness subsequently stated that it was the 20th of August.

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stock I asked the agent, Mr. Scott, to let me forego my agreement, which he kindly did.

3977. It is your opinion that it would be better for cows to be kept in the country rather than in the metropolis?—I must say so, although the other is to my advantage, because I have a length of lease of my premises; but still I cannot avoid saying that I think that if cows could be kept a short distance from town it would be more beneficial.

3978. (*Dr. Playfair.*) How many of your cattle died?—Eleven.

3279. And how many were killed?—30 were killed. Seven of the 48 were sold, as the families went out of town. I had only 41 when the plague first came; 30 of them were slaughtered and sold, and as to 11 of them I gave the Government inspector the receipt which I got from the knackers.

3280. Out of 41 animals the Government got a return of only 11?—Yes. I gave the Government inspector the receipt which I got back. I think that it cost me 14*s.* to get those cows taken in.

3281. You have stated that you think that it would be desirable to have dairies out of town; would it not be much more for the health of the cattle if they were able to go out to pasture occasionally?—I think so.

3982. In the town dairies the cows are often confined for a long time without going into the country at all, are they not?—They are, from the time that they come in till they go out again.

3983. That may be years?—If a cow is healthy and well she generally loses her milk in the course of 11 or 12 months, and becomes fat.

3984. Is not the bull often brought to cows in dairy sheds in London?—Very few of us calve; it answers our purpose better to sell out fat cows, and to bring in fresh cows in their place.

3985. Do you think that the milk would be better if dairies were outside London, instead of being in the close streets?—I do not think that it would make much difference. I could serve my customers much better by having my cows in London than by having the milk from the country, unless I had the management of that country milk.

3986. Do you serve your customers with milk from the country?—Yes; from Westbury in Wiltshire.

3987. Is it in good condition?—It is very good, but it is impossible to make it produce any cream after we get it in London.

3988. It shakes too much?—Yes; although the milk is quite as good in quality as we get in London, but it will never set to get cream from it.

3989. But you might get cream up in a similar way to the milk which is brought to you?—Yes; I think that that might be managed if it were not so far from London.

3990. (*Mr. M'Clean.*) How long had the cows been in your shed before the first appearance of the disease?—I could not say. I do not think that one of them had been a twelvemonth, because the cows were sold out after the families were leaving London.

3991. Had you to pay the expense of sending the diseased animals to the knacker's yard?—Yes; I paid 14*s.*; that is what they charged me when I got the account back.

3992. (*Mr. Read.*) What did they give you for the dead bodies?—Nothing.

3993. At what do you estimate your loss?—My loss is about 750*l.* The cows cost me 900*l.* to place them there, and I got 158*l.* back for the cows which I sent in to be slaughtered.

3994. For the 30 cows?—For the 30 cows.

3995. You do not suppose that the slaughter-house to which you refer was in very bad condition previously to your loss?—No; I do not think that it was, any more than other slaughter-houses are.

3996. Have you had many losses from pleuro-pneumonia?—Yes, I have, years ago; but not lately.

3997. How many animals do you think you have previously lost in a year?—I only at that time kept eight cows, and I lost nine in 13 weeks with pleuro-pneumonia.

3998. I suppose you think that it is impossible to keep cows in a healthy state for a very long time in our London cowhouses?—I do not know; mine go out fat and well after being a twelvemonth in the shed, and over that time.

3999. But if there is a disease in the country, do you not generally come in for it?—Yes; we generally suffer from the epidemic of the foot and mouth disease.

4000. But you do not often lose cattle from that, do you?—It has been rather fatal in the last few years.

4001. You have mentioned that two or three of your cows showed different symptoms at the beginning of the disease?—Very different.

4002. One suffered from constipation, and another from diarrhœa?—Yes.

4003. Had the one with diarrhœa shown any previous symptoms before she began to scour?—She refused her grains a few hours before she began to scour.

4004. What sort of cows do you generally keep; foreign cows?—No; I never had but one foreign cow in the shed at that time; that was a Dutch heifer; and she stood as long as any cow in the yard. I do not think that I had bought any cow for six weeks before this disease occurred.

4005. Yours I suppose are chiefly short-horned animals?—Yes; from Yorkshire, and that part of the country, I have bought very excellent cows.

4006. What was the usual price at which they would come in?—I have given 22*l.*, 23*l.*, 24*l.*, and 25*l.*; sometimes 20*l.*

4007. Where do you generally buy your cows?—I have generally bought mine of Mr. John Lowe and another man, Mr. Johnson, at the Metropolitan Market. I have bought a good many of Mr. Miller.

4008. (*Chairman.*) Did you purchase any cows recently before the outbreak?—No; not for five or six weeks. I think that I might venture to say six weeks. The last cow I bought on June 19th.

4009. How long do you generally keep a cow in your cowshed?—If she will milk on, I keep her for a twelvemonth.

4010. And then you sell her?—Yes; as a fat cow.

4011. You are continually changing your cows?—Yes. We perhaps should require to purchase two or three when we send two or three out, or something like that.

4012. What becomes of your manure?—A man of the name of Lake has fetched it away every morning from my place, till lately. It goes down, I think, into Kent.

4013. What has happened with the manure since the outbreak of the disease in the metropolis?—They fetched all mine away in the manner which I have mentioned up to the time when the outbreak occurred; and what little I make from my horses they fetch perhaps once a week or so.

4014. Do you mean that the carting away of manure from the cowsheds in London has been practically stopped since the outbreak?—I think not.

4015. Are no means taken to disinfect it?—I have disinfected it since the outbreak. I put chloride of lime on it; but I do not know of anything more that has been done. I cannot tell what may have been done in other counties.

4016. (*Viscount Cranborne.*) Do you always purchase your cows in the Metropolitan Market?—Yes; I think I may venture to say that I have done so in the last two years.

4017. Have you ever purchased direct from farmers in the country?—Some years back I purchased some from Reading in Berkshire.

4018. Did you go on for any length of time upon that system?—I did not get the class of cow which I wanted.

4019. The animals were not so good as what you got in the Metropolitan Market?—They were not.

4020. I suppose that otherwise there was no diffi-

culty in getting them?—They became very scarce, and that is why I discontinued that practice.

4021. How were they brought up to you; by rail?—Yes.

4022. (*Chairman.*) Is there anything else to which you wish to call the attention of the Commission?—No; I have only come to speak the truth upon any question which might put to me.

4023. (*Viscount Cranborne.*) Have you had anything to do with the inspectors?—Very little.

4024. What inspectors have you had to do with?—Mr. Crowe is the district inspector for me.

4025. Is he appointed by the Government or by the magistrates?—By the magistrates, I think.

4026. What district is yours?—Mine is St. Margaret's.

4027. Do you know whether Mr. Crowe is a veterinary surgeon?—No, I think not.

4028. What is he by trade?—I cannot say; I do not know what his trade is.

4029. But it is not that of a veterinary surgeon?—No. The Government inspector is no doubt a veterinary surgeon. Mr. Crowe called on me, I think, about two or three days before the outbreak came, and was remarking how clean and nice the cattle were kept, and he said that he hoped that they would remain so.

4030. Do you know whether he is a farmer or a tradesman?—He is not a farmer. I should think that he is something of a tradesman, but what I do not know. His brother I know is a broker, but I do do not know what he is himself.

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4031. Has the Government inspector ever been to your shed?—Yes.

3032. He is a veterinary surgeon?—Yes. I showed him the cows which were remaining. He said, "You "have done perfectly right; you have not sent them "off the place." He said, "There are four cows "there which you may have slaughtered." I said, "There are four cows here which I have had slaughtered this morning." Mr. Barnard Holt was on my premises at the time; and I said, "I should wish "Mr. Barnard Holt to inspect these bodies, to see "whether they are fit to go to market; if not they "shall not leave the slaughter-house." When they left my place I could not see any signs of their being unwell, but I was afraid that they would be so, and I had them slaughtered. Mr. Barnard Holt went and examined them, and did not in anyway whatever condemn them.

4033. No inspector has slaughtered your cows without your consent?—No. He left instructions that such and such a cow must not leave the sheds without being slaughtered on the premises, and I had that done, and had lime put over them, and had them sent away to the knackers.

4034. (*Mr. Read.*) How long after the disease first appeared did you send for the inspector?—I did not send for him at all.

4035. But he came?—Yes.

The witness withdrew.

Mr. William James Bonser and Mr. Robert Calcutt examined.

Mr. W. J. Bonser and Mr. R. Calcutt.

4036. (*Chairman.*) (*To Mr. Calcutt.*) What are you?—I am a butcher by trade.

4037. (*To Mr. Bonser.*) What are you?—I am a commission meat salesman.

4038. (*Mr. M'Clean.*) The principal point on which we wish to obtain your evidence is with reference to the supply of London with dead meat from the country. How far do you consider it practicable that there should be no slaughtering done in London, but that the meat should come from Scotland, Norfolk, and different places?—I think that it would be altogether impracticable in the hot weather.

4039. At other seasons would it be practicable?—It might be practicable at other seasons; but I think that then it would be attended with great inconvenience.

4040. How would you regulate the supply of dead meat if it all came dead from every part?—I think that it could not be done. The meat which is now killed in London supplies the deficiency of that which is sent up dead from the country; but if all were sent up dead I think that there would be nothing to supply the deficiency.

4041. (*Chairman.*) How do you ordinarily conduct your business?—We every morning receive consignments of meat from all parts of this country, and also from Scotland, and a good deal from abroad. We do not know beforehand what will come; we cannot tell till the morning. Occasionally we receive an advice on the previous day, but not always. That meat is sold at the market price of the day, and the account sales are returned the same day.

4042. Is yours entirely a wholesale business?—Entirely.

4043. Do you not give notice according to the requirements of the butchers in the west end, or in other parts of London, of the amount of meat which you require from the country?—We neither give notice nor receive notice of what is coming.

4044. Has your business been largely increasing of late years?—Very largely.

4045. Where are the animals slaughtered which come up from the country?—The persons who send them up have them slaughtered on their own premises, I should say, in almost every instance.

4046. Are those premises in a town or on the farm where the cattle are grazed?—Principally in towns. Sometimes the farmer has his cattle slaughtered, and sent up from his farm by railway, but by far the larger proportion come from towns.

4047. In those instances which you state of farmers killing their own cattle, in what part of the country do the farmers reside?—In all parts of the country. The quantity coming in that way is a very small proportion compared with that which is sent by dealers. From Aberdeen very large quantities come; frequently 100 tons of meat in a day.

4048. Could not that system be extended of the farmers killing their own cattle and sending them up to you?—A great many have tried it, and have not found it answer, and they have gone back to the system of selling their cattle to dealers.

4049. Why does not it answer?—I can scarcely say why, but I believe that it is principally from their not being so well able to dispose of the offal as a person in the trade would, and from its not being required in the country as it is in large towns. I should fancy that that is one of the principal reasons.

4050. Does the meat arrive in London from Scotland in good condition?—In very good condition, considering the distance; but sometimes, in summer, it is almost useless.

4051. How is it in winter?—In winter it comes in very good condition. It comes in better condition from Scotland than from many places at a shorter distance; that is, I should say, from the cold temperature. The meat keeps much better, having been killed in a cold temperature, than when it has been killed in a warm temperature.

4052. Have you a large trade from the butchers in the country towns?—It is principally the butchers who send to us.

4053. Supposing that a regulation was put into force in the metropolis which prevented any animals leaving the metropolis alive, confining the market entirely to butchers' stock; what effect would that have on the market?—I suppose that that would be during the present emergency?

4054. Exactly so.—I do not think that it would affect at all the supply of butchers' meat in the

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market. I think that it would probably tend to prevent the spread of the disease.

4055. You do not think that it would create any difficulty in the Metropolitan Market?—I am not perfectly acquainted with the Metropolitan Market myself, but I believe that is the state of things now; there are very few, except butchers' animals, which are sent to that market, on account of the dread of infection. I have understood that to be the case, but I cannot speak of my own knowledge.

4056. We are told that since the last Order in Council has been issued animals sent to the Metropolitan Market for slaughter have been bought by butchers, and taken to Birmingham. Would the checking of that have any effect upon your trade?—It might produce some inconvenience, but I think nothing to be compared to the injury which is now sustained by the disease.

4057. Then in your opinion it would be desirable to confine the Metropolitan Market to animals sent there for slaughter?—Yes, as far as my own opinion goes; but I am not in a position to speak with any authority upon a point of that kind, because I do not attend that market.

4058. We have been told that it is now somewhat difficult to obtain proof that the animal does not leave the market for other purposes. Do you consider that it would be necessary to alter the regulation, as to the slaughter-houses in the metropolis, in order fully to carry out that prohibition?—I do not see in what way any regulations could be made to carry that out.

4059. Can you state at all the number of slaughter-houses which there are in the metropolis?—Only in the city. I can give you the number in the city from the report by Dr. Letheby, which probably the Commissioners have seen; there are 58 in the city of London.

4060. But throughout the metropolis there are a much larger number?—Yes; but I could not state the number.

4061. Would there be any great inconvenience in limiting to some extent the number of slaughter-houses in the metropolis?—I think that there is considerable inconvenience already experienced from the limits which have been previously placed upon them, and that in consequence of the numbers being less more business is done at each, and that there is consequently more crowding and less cleanliness. I am sure that that is the case in the city.

4062. Would it be possible to inspect all the slaughter-houses in the metropolis to such an extent that you could actually prove that the animals sold in the market came there and were slaughtered there?—I do not see how that could be carried out.

4063. What effect would an order such as I have described have on the country markets; that is to say, forbidding animals which come to the market leaving the town alive?—I cannot see that it would have any effect upon the country markets.

4064. A suggestion has been made to us that foreign cattle should not leave the place of their landing, but that a market should be created there for them, and that they should be there sold and slaughtered upon that spot; do you think that that would be practicable?—I think that it would be very injurious. We find very great inconvenience arising from it to the extent to which it is now carried out. In case of 100 cattle being kept there by the inspector who may have reason to suppose them to be diseased, they are obliged to be slaughtered very badly for want of proper conveniences; there is no proper place for keeping them, and they must all be slaughtered together, and brought into the market at unseasonable times, and at very great disadvantage. The loss to the senders is very heavy, and that of course deters their sending them.

4065. If greater conveniences were made at the landing places for slaughter, would that be the case?—I do not think that there can be such conveniences as are necessary. These animals are not perhaps required all in one day.

4066. How long are animals generally kept from the time when they are sold in the market till the time of their slaughter?—Generally a few days.

4067. They are always kept a certain number of hours, in order for them to cool, are they not?—Sometimes it is done so, and sometimes they are killed immediately; but a butcher prefers keeping them 24 hours.

4068. Where are they generally kept for these 24 hours?—The butchers have their places either adjoining their slaughter-houses or somewhere in the neighbourhood. There is one question which you have asked, I think, in reference to the possibility of preventing animals from the Metropolitan Market being taken again into the country. I think that a regulation has lately been made that the hair should be cut off the tails of all animals sold there, and it would be very easy to ascertain whether any of them were afterwards taken to the railways.

4069. And the railway authorities might have directions not to allow them to pass?—They might perhaps have those directions. It would be easy to ascertain whether they were taken there or not.

4070. As I understand now, in the market all the animals sold there are marked?—I have understood that for the last few weeks every animal has been marked before it was taken away. I have understood that that is now the regulation, but it is a regulation which I imagine could be easily made.

4071. And you think that that would be desirable, in order to check the disorder?—It would prevent the possibility of their being taken without its being known.

4072. (*Mr. Read.*) Would there be any practical difficulty in having an order carried out that no live cattle whatever should leave the metropolis?—I should imagine not.

4073. That is to say, if it were made penal for any owner to drive or convey cattle from the metropolis?—There would be no difficulty if it were carried out for a time; it would perhaps be productive of great difficulty if it were a permanent regulation.

4074. I believe that there are from 1,500 to 2,000 head of bullocks a week which leave the Metropolitan Market to be slaughtered in the provinces. It is your opinion that, we will say for the next month, or say during the cool weather in the autumn, no great difficulty would be experienced in killing these animals and sending that meat away dead?—It would not be possible to send it into the country dead. The effect of such a regulation as you have mentioned, I think, would be to prevent the animals being sent to the cattle market, in the first place. A country butcher can come to London, and buy cattle, and take home; but he could not buy it slaughtered in London; the appearance of the meat would be altered.

4075. Then how does so much dead meat come from Aberdeen?—Because the London buyers are accustomed to it. They pay much less attention to the appearance of the meat, as they know that it is good; but the country buyers do not do so.

4076. Then it would be simply a matter of prejudice?—Yes; except that the meat killed in Scotland comes in infinitely better condition than meat killed in London, and going into the country, on account of the different atmosphere in which it is killed.

4077. That would not be so generally in the autumn, would it?—In any time of the year. The meat killed in London is very different in appearance from that killed in the country.

4078. Why should the meat killed in London be worse handled or prepared than that killed in Norfolk?—It would not be worse prepared, but would be killed in a different atmosphere, and would deteriorate much more rapidly. There is another reason, namely, that the beasts brought to London are in a different state of health, from having been driven.

4079. I think you stated that farmers who had

tried to kill cattle on their farms had discontinued that practice?—I know several instances of it.

4080. Would not that generally arise from the want of conveniences?—I cannot say the reason; but I only know that they have done so, very much to my surprise.

4081. You have meat, you say, from abroad. Where from?—From France, Holland, and Hamburg.

4082. At what time of the year do you receive it?—All through the winter, and as far into the spring as the weather is sufficiently cold. They are now just commencing it again.

4083. Does it arrive in pretty good condition?—Yes; in good weather.

4084. You mean by good weather, cold weather?—Yes. From Hamburg we have dead meat almost every day through the winter.

4085. Is it an increasing trade?—It is very much increasing.

4086. What would be the relative expense of sending a carcase of beef from Hamburg, as compared with sending it alive?—The expense of sending a bullock alive is 1*l.* from Hamburg; and the expense of sending a dead bullock is, I think, about 8*s.*

4087. And of course the meat in cold weather would run much less risk of damage from the voyage than the live bullock would?—Very much less; they always send it dead when they can.

4088. Surely, if they can send it all that way dead at a smaller cost, the country people might be satisfied with having dead meat from the metropolis, might they not?—Perhaps they ought to be, but hitherto they have not been.

4089. (*Dr. Playfair.*) How long does a steamer generally take in coming from Hamburg?—About 40 to 48 hours.

4090. (*Dr. Quain.*) Has the disease had any influence on the class of meat which you now receive; is it different from what you received before the disease occurred; in other words, do you receive any meat which you suspect to be diseased?—I should think that there is a great deal of meat sent up in the incipient stages of disease. We frequently receive meat with the certificate of the inspector, a veterinary surgeon, in the country, that it is fit for human food. There is no doubt that it has not been well, and that there has been something amiss with it, and it has been slaughtered and sent up with that certificate that it is not unwholesome.

4091. Would your technical knowledge enable you at all to say that it is diseased?—We could say that it was not healthy, but we could not say whether it had had this Cattle Plague or any other disease. Sometimes there are indications of particular diseases.

4092. Can you give any opinion upon the meat which comes to you with the certificate of a veterinary surgeon?—No. I cannot say anything particular about this disease. I have not seen an instance of it myself.

4093. You have not heard that any ill effects have arisen from that meat being sold?—No.

4094. (*Viscount Cranborne.*) How long a period do you think elapses between the time when, in this weather, a beast is slaughtered in Hamburg and the time when it reaches the consumer?—I should think that it would be killed about 24 hours before it is sent, and that it would be about 48 hours on the passage, and it may be kept for 12 or 24 hours more in cold weather. It is very cold in Hamburg, and therefore the meat would keep longer if it were killed there than if killed in some other places.

4095. If the importation of live cattle were prohibited altogether, do you think that in this cold weather the same amount of meat would reach this country dead?—I should scarcely think so; when it comes in dead it must be sold.

4096. There is more uncertainty in getting a good price?—Yes.

4097. Are there large slaughter-houses at Hamburg?—There is a very large public slaughter-house; I do not know what others there may be.

4098. Do you know what inspection there is before the foreign cattle leave the port?—I believe that at all the ports there is a very good inspection; but I cannot speak of it from my own knowledge.

4099. Do you think that if it was considered advantageous to prohibit entirely the importation of live cattle from countries such as Russia it would be possible that a dead meat market could be carried on?—Not from Russia.

4100. It would be too far?—Yes.

4101. (*Dr. Playfair.*) Is there at this moment any traffic from Russia, except an experimental herd? As far as I can learn, only one cargo has been brought.

4102. From Hungary, is there not a considerable traffic?—I should think so; they would come overland. Great numbers of cattle now come through Holland by way of Magdeburg, and are shipped at Rotterdam.

4103. Considering that it takes four days to come from Galicia here, would that be too long for dead meat to come from the borders of Galicia?—It would very much depend upon the weather, and the way in which it was carried. Although the meat coming from Hamburg is in perfectly good condition for use, it is very much disfigured; it does not come in condition to make the highest price, or to be kept for a length of time afterwards.

4104. (*Viscount Cranborne.*) In what way is it disfigured?—It is stained, and does not look bright.

4105. But is that any indication of a deterioration of quality?—No; the quality is not deteriorated, but the value of the meat for sale is.

4106. Do you mean to say that the purchasers in England are so foolish that they have not discovered that those signs mean nothing?—Perhaps Mr. Calcutt can speak upon that point.

Mr. Calcutt.—Of course meat coming from abroad or anywhere else, having a fresh appearance, although being of the same quality, would make more than a corresponding side which had been what we term muddled; that is to say, discoloured.

4107. Upon what does that curious phenomenon turn; is it the folly of cooks?—No.

4108. Then why do people attach to these signs that which they really do not bear?—When we go into the market, we find that sheep which have been badly packed will not make so much by perhaps a halfpenny a pound; the salesman knows that he cannot hold them, and therefore he is inclined to take a lower bid.

4109. Because it is obvious that they must be sold?—Yes; for one thing; and in the next place they are not so good to the eye, and in many shops they could not be hung up for more than one day.

4110. Are these marks the signs of incipient decomposition, or are the animals not sold so well because they are not so pleasing to the eye?—It is simply because they are not so pleasing to the eye; you cannot call it a species of decomposition.

4111. (*Chairman.*) (*To Mr. Bonser.*) Are there any other foreign ports from which you get dead meat besides Hamburg?—We receive French meat by way of Jersey; we receive meat from Boulogne and Ostend.

4112. Do you receive large quantities?—Yes; large quantities in the season.

4113. What do you call the season?—The winter; in the winter it comes dead, and in the summer it comes alive.

4114. In the next few months are you expecting dead meat from these foreign ports?—As soon as the weather gets a little colder they will send dead meat.

4115. (*Viscount Cranborne.*) Do you receive dead meat from Rotterdam?—We are receiving it from there two or three times a week.

4116. (*Chairman.*) Then the importation of live stock in the next two or three months would not be so very important for the country?—It is such a very large branch of the trade that I should not like to say that it would not be important.

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4117. Can you give any idea of the proportion of live and dead meat which will come to England in the next two months?—No; because I have no connexion with the live cattle trade.

4118. Does your principal business begin when the cold weather begins?—No; we have business all the year round; but the supplies are larger in the cold weather. Perhaps I may be allowed to say that I think that the dead meat trade would be very much encouraged if greater facilities could be afforded at the Custom House; there is often a very great delay there. I do not know whether that is possible.

4119. What delays occur there, and what remedies would you apply?—In the case of a Hamburg boat arriving at 11 o'clock on Sunday morning the meat cannot be landed; the boat is put off into the stream; and on the Monday morning, when the Custom House officers come (I think that it is at 7 o'clock, but I am not quite certain), the meat on board that boat has to be brought in lighters, and it does not get into the market until perhaps 10 or 11 o'clock; that is 24 hours after arrival.

4120. (*Viscount Cranborne.*) There is nothing which could possibly be contraband in dead meat, is there?—They appear to fear it. I have been at the Custom House, and have seen the officials about it, but they do not seem as if they could afford any greater facilities.

4121. (*Mr. Read.*) What have the Custom House officers done in the matter?—They will allow the meat to be landed up to 10 o'clock on Sunday morning; but if it is after that they will not allow it. They agreed some time ago to have it landed at daylight by paying the expenses of the officers.

4122. (*Viscount Cranborne.*) How does your meat generally come; in sacks or in boxes?—Generally in a sack.

4123. You could not conveniently import tobacco with it, could you?—I am not aware whether it has been imported with it.

4124. (*Chairman.*) Is there the same trade in dead meat at the northern ports, such as Hull and Liverpool?—Yes; sometimes we have dead meat by way of Hull instead of coming to London.

4125. I suppose you would be of opinion that if it was compulsory to slaughter all the animals on landing the dead meat trade would be increased?—I think it would be probably beneficial to myself, but I think that it would be a very extreme measure to take.

4126. And not practicable even for the winter months?—I think not.

4127. (*Mr. Read.*) Intensely cold weather is rather injurious to meat than otherwise, is it not?—A very severe frost is so. Cold, clear weather is the most suitable.

4128. (*Chairman.*) (*To Mr. Calcutt.*) I believe that you are a butcher in a large way of business?—I will not say large, but moderate, or more than moderate.

4129. In what part of London does your business lie?—In Westminster.

4130. Your trade, therefore, is with the West End?—With the West End and with Westminster, Dean's Yard, and all round the immediate neighbourhood.

4131. Will you state how you conduct your business with regard to the purchase of stock?—During the winter months the greater portion of my meat is bought dead, that is to say, in Newgate Market. With regard to the summer months, I never miss a week in going to the Islington Market, and I there buy a portion alive and a portion dead. I attend every morning, not missing six mornings throughout the year.

4132. Have you a private slaughter-house of your own?—I kill at a neighbour's. I lost my licence in the second year that the licensing came into effect.

4133. When you kill at this private slaughter-house, have you to drive your animals some distance through the metropolis?—They are driven from the market to the slaughter-house, within the regulated hours. My animals are always home by 9 o'clock in the morning.

4134. How long have you to keep them at this slaughter-house before you slaughter them, from the time at which you purchase them in the market?—It does not average three days.

4135. Have you sheds?—I have sheds for the oxen, and the sheep go into the park, or into Dean's Yard on the grass.

4136. Have you considered the subject of stopping the movement of cattle, and not allowing the cattle to leave the metropolis alive when once they arrive there?—I think that within the last few years a trade has sprung up to a great degree of butchers coming to London week after week to buy stock to send into the country to kill. I myself know several men from Oxford who come up invariably every week to buy oxen, and to take them down.

4137. What would be the effect of this measure upon those parties?—I cannot tell you that; there is no doubt that it would be an injury to them.

4138. Do you purchase much foreign dead meat?—No; it does not suit me.

4139. Where is the foreign meat principally sold?—It is distributed all over the market.

4140. Why does not it suit you?—The quality would not suit me. The principal part of our supplies comes from Scotland for four months after Christmas. I should say that perhaps 19 parts out of 20 of all that I sell come from Scotland for four months after Christmas.

4141. Do you mean animals slaughtered on the farms where they have been grazed or reared?—I cannot speak positively as to it, but I should say that the principal part of them comes from Aberdeen.

4142. Do you consider the slaughter-houses in the metropolis to be in a good condition?—Yes, very good; and I should say that at the present time there have been several persons who have been opposed for not keeping them clean, and not attending to them, and for that reason I know that the butchers as a class are very zealous to keep them clean, and to do everything which they can to meet the officers, so that the officers or the neighbours should not have cause of complaint; they are more afraid of the neighbours, in case of an opposition, because in all courts now, if an opposition is got up by the neighbours, it tells so much against them.

4143. Would it be possible for a limited time to restrict the number of these slaughter-houses, so as to bring them more easily under inspection?—I do not see that you would do any good by it.

4144. About what number of slaughter-houses are there in the metropolitan district?—I cannot give you the number; no register is kept which is open to the public.

4145. There must be over 700 or 800?—More than that; I think that the licensing extends to a radius of six or seven miles.

4146. Supposing that an order forbidding animals alive to leave London were issued, what proof would you be able to have that they were not sent into the country, but were slaughtered in the different slaughter-houses in the metropolis?—You could have no proof that they would not be sent away; but I think that instead of their coming to London they would be drifted into the country through other channels. I do not think that you can ever make the country people consume meat which has been killed in London, on account of their prejudices.

4147. Would they not be able to get a sufficient supply in the country for their wants without coming to the metropolis at all?—In many times of the year they would not.

4148. But in winter, for the next three months, do you not think that they would get a sufficient supply without coming to the metropolis?—I could not give an answer to that question.

4149. Can you state whether the trade in the country from the metropolis is greater in the winter

than in the summer?—I cannot, of my own knowledge.

4150. (*Viscount Cranborne.*) What is the cause of the prejudice which is entertained against meat which is killed in London?—I cannot tell you the cause, but undoubtedly there is a prejudice, and a prejudice which you could not get over.

4151. Do you mean to say that the private consumer in the country would recognise whether meat had been killed in the country or in London?—No doubt he could tell. Our customers here invariably leave everything to us, and so long as we can give them a good article, and can suit their tastes, we have done our duty. We are not called upon to know whether the meat is particularly good to the eye; whereas in the country it would be the reverse.

4152. You mean that the consumers in the country are more exacting?—Yes; they see the thing; whereas here they do not. I do not consider that the actual consumer in the country would buy meat killed in London which had been hung up in a shop for public sale.

4153. (*Mr. Read.*) Are not the foreign cattle of sufficiently good quality for your trade?—No.

4154. You prefer good English bullocks?—I prefer good Scotch bullocks to anything. My opinion goes so far as to say that no one so well as a Scotchman knows how to produce a bullock for the London trade.

4155. (*Dr. Playfair.*) How many months do you slaughter for yourself in London?—About seven months, upon the average.

4156. Between what dates?—Commencing in May, and continuing on up to the end of November.

4157. You find that you can get dead meat from Scotland in the other months?—Yes, but not in sufficient quantity for the demand; with regard to the Scotch meat, we have to pay a higher price for it than we should for any other.

4158. That is on account of its excellence?—On account of the quality of it.

4159. (*Mr. Read.*) Do they send you up whole carcases, or hind quarters mostly?—A great many animals are sent up in sides, packed in a single cloth. They come out as clean as if they came out of our slaughter-house.

4160. Do you know why the Government contractors generally buy foreign stock?—Because it is cheaper.

4161. Not because it is better?—No.

4162. Nor because the animals are generally healthier?—No. Generally the foreign stock which is now brought into our market has trebled itself within the last three years.

Mr. Bonser.—And the quality is wonderfully improved.

Mr. Calcutt.—The quality is altogether different.

4163. Is there any great quantity of fine big old beasts?—Yes. A friend of mine last Monday fortnight paid 84*l.* for two foreign oxen.

4164. Still is there not a great deal of coarse heavy meat about them?—Yes; but it goes for different purposes.

4165. (*Chairman.*) (*To Mr. Bonser.*) In considering the subject of the Rinderpest in England, have you thought of any effectual remedy for stopping its spread?—I cannot say that I have, for I am not at all practically acquainted with the disease.

4166. (*To Mr. Calcutt.*) Have you thought of any remedy for it?—I have never seen an instance of the disease in a live animal.

4167. (*To Mr. Bonser.*) Is there anything else to which you wish to call our attention?—I think not, unless merely to mention the great increase in the importation of foreign cattle in the last few years, and the great improvement which has taken place in them, and the very ill effects which would arise from any check given to that importation.

4168. (*Dr. Playfair.*) Are you of opinion that this disease has been of foreign importation?—I am decidedly of opinion that it has not.

4169. Upon what do you ground that opinion?—From nearly all the foreign cattle, as far as I have seen, being healthy. The disease, I believe, is not known in the parts from which we received the foreign cattle.

4170. Did not you say that a considerable number of foreign cattle were imported from Hungary?—No; I did not say so. I understand that they are brought across overland; but I do not know.

4171. Are you aware that cattle of the Hungarian breed are brought almost every week to the Metropolitan Market?—No; because I do not attend the Metropolitan Market.

4172. Would you not qualify your statement when you know that the disease is in Hungary at the present time?—As far as I can learn, the foreign cattle which have been brought here have not shown any signs of that disease, and it has broken out in so many places to which I believe that foreign cattle have not had access that I think it must have originated at home.

4173. Would you approve of an order preventing the importation of any foreign cattle from infected districts?—I am scarcely prepared to answer that question. I think that it must entirely depend upon the extent to which the disease is prevailing there, and the amount of danger.

4174. Are you aware that at the present moment France has prohibited dead meat from being exported from England into that country?—I was not aware of it.

4175. Would you extend the prohibition of the importation of dead meat into this country to any infected district abroad?—Certainly not.

4176. (*Mr. Read.*) Has the trade in dead meat from abroad very much increased lately?—Very much indeed.

4177. And in your opinion is it likely to increase?—I have no doubt that it will increase very rapidly every year, if it is not checked; they will always send dead meat if they can, when the weather will allow them, because the expense is less, and the risk is less.

4178. (*Chairman.*) (*To Mr. Calcutt.*) Are there any additional remarks which you wish to make to the Commission?—No.

The witnesses withdrew.

Adjourned to to-morrow at 10 o'clock.

Friday, 20th October 1865.

PRESENT :

EARL SPENCER.
DR. LYON PLAYFAIR.
MR. M'CLEAN.

EARL SPENCER IN THE CHAIR.

W. Cawkwell, Esq. and J. Allport, Esq.
20 Oct. 1865.

WILLIAM CAWKWELL Esq. and JAMES ALLPORT Esq. examined.

4179. (*Chairman.*) (*To Mr. Cawkwell.*) You are traffic manager, I believe, of the London and North-western Railway ?—I am.

4180. Can you state the quantity of stock which travels along your line ?—I have a return for the month of September of the present year. I have the number of cattle, pigs, and everything. The number of cattle carried was 28,756 for the month, calves 2,080, pigs 25,307, and sheep 169,418 ; and we carried 1,496 horses.

4181. Is that traffic principally to London, or is it from London to the country as well ?—Taking the same month, the quantity of cattle received in London was 1,589 waggon loads. I have not the pigs and sheep for London. Those waggon loads would average about seven or eight head of cattle per waggon; probably seven would be the nearest number.

4182. (*Dr. Playfair.*) That is about 11,000 ?—Yes. We sent from London for the same month 400 loads ; that would be about 2,800 head of cattle.

4183. (*Chairman.*) Then there is a large balance still ?—No doubt there is a very large consumption in London.

4184. The remainder of the traffic is along your line from one local station to another ?—The remainder is from town to town upon the line. I just had got out last evening one or two of the principal places. I have Manchester, for instance. In the month of September we received at Manchester 1,273 loads ; that multiplied by 7 will give the amount of cattle in the same way. We sent from Manchester 154 waggon loads. At Liverpool we received 600 waggon loads, and we despatched from there 1,407 waggon loads. I may explain that at Liverpool the principal part of the cattle comes by sea from Ireland, so that we do not bring so much in as we take out. At Birmingham we received 570 waggon loads, and sent away 60 waggon loads ; therefore the remainder was consumed in Birmingham. At Wolverhampton we received 450 waggon loads, and sent away 90. I have looked up some old reports ; I could not lay my hands on one of very recent date ; but it shows the stations to and from which we send cattle on our line. It is a very extensive trade upon our line ; it comprises all our principal stations.

4185. Have you any means of distinguishing between lean stock and butchers' stock which travel along your line ?—No ; except principally by the places to which they are sent ; for instance, the Irish cattle are principally lean cattle, which are sent to the Midland counties and to Herefordshire and some other places in that neighbourhood, where the cattle are sent to be fed, and afterwards they are forwarded from there to London and other markets as fat cattle ; but we also bring a very large amount of fat cattle from Ireland to London for the London market.

4186. At what season of the year does the larger quantity of the Irish cattle come to England ?—The fat cattle principally come in the winter ; the lean cattle, I fancy, come in the latter part of the summer ?

4187. Then the great trade in lean cattle is now principally over ?—I think that it is.

4188. At what time of the year will it recommence ?—I cannot tell you that exactly. I could inform you ; but I think that there is also a spring trade.

Mr. Allport.—Very little. The lean cattle principally come from Ireland in the summer time for the autumn pastures, to fatten up for the London and other large markets in the winter ; they generally come during the summer time.

Mr. Cawkwell.—The main trade is in the latter part of the summer.

4189. Is September an average month on the London and North-western Railway ?—I can send you an average month. I have no documents here at present.

4190. Is it a fair sample of an average month during the year ?—I have no return here showing the Irish cattle separately. I will furnish the Commissioners with a statement of an average month.

4191. With regard to stock coming from Scotland, have you a large quantity of live stock travelling along your line from Scotland ?—We have. I am afraid that I have not the Scotch traffic separately, but I will send it also to the Commissioners. I have some returns here for 1854 and 1855, but probably they would not represent what is in existence now.

4192. I suppose that there is no other place on your line, except Liverpool, where the Irish cattle come ?—They come to Holyhead principally now.

4193. What number come to Holyhead ?—We receive both by Holyhead and by Liverpool.

4194. (*Dr. Playfair.*) Would the month of September be a fair average of the whole cattle traffic upon the London and North-western line ?—Yes. I can also give the Commissioners the quantities from Wales. We have a cattle traffic from Wales.

4195. (*Chairman.*) I suppose that you have not a large traffic in foreign cattle along your line ?—A considerable quantity of foreign cattle now comes to go down our line. Taking the month of September for 1863 and 1865, it has just doubled. In September 1863 we sent 202 loads of cattle, and in September 1865 we sent 400 loads.

4196. Are they principally store beasts or are they fat beasts ?—They are fat beasts ; and we are now sending them as far as Birmingham and Wolverhampton, which is quite a new trade in cattle.

4197. From London ?—Yes ; formerly the London cattle only went the shorter distances.

4198. Do foreign cattle go to other places besides Birmingham and Wolverhampton ?—Yes. I merely mention those places as the greatest distance that we send them to.

4199. Is there a large trade between the butchers in London and the butchers at Birmingham in live cattle ?—The Birmingham butchers buy in the London market, and they take the cattle down. That trade has very much increased recently.

4200. We have been told that the trade in dead meat has increased lately throughout the kingdom. Can you give us any facts upon that point ?—I do not think that it has ; but I will look that matter up, with pleasure, and will let the Commissioners know. I could not tell without examining our books ; but I will do so. We carry dead meat from many places on our own line from the Midland Counties and also from Scotland. There is a considerable trade in dead meat from Scotland to London ; but I am not aware that that has increased much recently.

4201. How is that trade conducted ?—The beasts are killed in various parts of Scotland, and then sent up as dead meat, consigned to the sellers in London ;

men who act as brokers; and they sell the dead meat in the market for the consignors.

4202. Have you any special mode of conveying that meat?—It is conveyed principally in hampers and cloths.

4203. By ordinary train or by luggage train?—By luggage train generally; nearly altogether by luggage train; in fact I am not aware of any coming by passenger train to any extent.

4204. At what time of the year is that trade principally carried on?—All the year round.

4205. Does it increase at all in the winter?—I do not think that there is any special increase of it in the winter.

4206. In your opinion, from your knowledge of the traffic in butchers' meat and in live stock in the country, would there be any difficulty, supposing that a regulation was passed prohibiting for a time cattle when they once arrived at a market town leaving that town alive?—I think that it would very much cripple the trade. In the first place, it would require special arrangements on the part of the butchers who kill the meat; they would have to provide hampers and cloths, at a very great expense, except they were going to do it continuously; and when the meat got to London of course it must all be sold immediately, they could not let it stand over from one market to another, as they now do with live cattle. I think that they would be entirely in the hands of the brokers and parties in London, who might offer them what price they chose for their meat, and that they would be obliged to sell. I do not think that they would be inclined to go far in that trade.

4207. I do not mean that the meat should be killed where it was reared or grazed, but that animals should be sent alive to the market, and should not leave it alive?—That has not been the custom, and I do not think that you would get them to buy dead meat in that way; it would require the same provision to be made by these people who now come up and buy the cattle and slaughter them at their own places; they would have to purchase hampers and cloths and every necessary for conducting the business, and as a mere temporary thing I do not think that they would be induced to do it.

4208. As far as the railway management goes, there would be no difficulty in conveying a greater quantity of dead meat?—No; we could convey it well enough.

4209. (*Dr. Playfair.*) What steps previously to the outbreak of this plague did you take to keep the trucks in a clean and good condition?—We always cleaned our trucks; we had them washed and cleaned out.

4210. After each journey?—Not always after each journey; but we had them kept reasonably clean. But since this Cattle Plague made its appearance we have issued instructions. Probably the Commissioners have had copies of those instructions already laid before them?

4211. I do not think that we have?—These instructions were issued at two different dates. The one set of instructions applies generally to cattle, and the other has applied more recently, in accordance with same recommendations of this Commission, to sheep and other kinds of animals (*handing in the same*).*

4212. What steps previously to the breaking out of this plague did you take in feeding and giving drink to the cattle as they went along the line?—We offered to unload the cattle and give them drink at any of our principal stations, and where we had not the proper provision for doing so we made it; but I do not think that it has ever been taken advantage of by the dealers and drovers. I do not remember an instance where they have required us to unload the cattle and give them drink.

4213. Is there no method on the trucks themselves of giving the animals drink?—No; you cannot get to them.

4214. Is there no possibility of putting troughs into the sides of the trucks, and putting water into those troughs when come to a station?—One half of the cattle would never get their heads outside; to begin with.

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4215. How many hours may live cattle coming from the north of Scotland be in the trucks before they are delivered in the London market?—I dare say that in some instances they will be 36 hours.

4216. And sometimes a considerable longer period, when there are delays; is it not sometimes as much as 50 or 60 hours?—Very seldom indeed, and I think that in that case they would necessarily be unloaded; but the cattle trade runs very punctually. We are obliged to do it, because the cattle are run to the different markets, and therefore they generally keep very good time. They almost always are run special, and they arrive in time for the markets, therefore they are almost always as punctual as passenger trains.

4217. Do you not think that it would be advisable if railway companies as public carriers established regular provisions for feeding and watering cattle which they engaged to carry along their lines?—If that was done then they would take the responsibility of any delay occurring upon the line, and we should be perpetually subject to claims for missing a market, or being rather later than some other person in the market, and then we should have claims for loss of profit upon the cattle. We give the owners of the cattle the option whenever they like of providing them with water and food, and I think that they are the proper parties to judge whether that is necessary or not. I do not think that railway companies could take the responsibility of judging, or of detaining cattle upon the road, contrary to the advice of the owners.

4218. You are aware that a cabman in London may be punished if he allows a horse to be above a few hours without watering?—I believe that there is some regulation of the sort; and it may be very proper to apply to the owner of the cattle, who may be the judge, but not to railway servants, many of whom can form no idea of how long the cattle may have been in the waggons, or whether they require food or water.

4219. Then you would wish the penalty to apply, not to the railway company, but to the owner of the cattle?—Yes; who always accompanies the cattle.

4220. Would not that interfere with the arrangements of the railway companies in the traffic?—No. We have offered to stop the cattle at any of our principal stations, and any accommodation is provided which the owners may choose to select.

4221. How would it interfere much with the railway traffic if in the present emergency the export from the London Market of live meat was stopped for two months?—It would interfere with railways to the extent of the loss of traffic which might arise. I do not think that it would be serious.

4222. Must not the populations both of the provinces and of London be fed, and would not dead meat replace living meat?—It might do that, or it might enhance the value of cattle and meat in their own districts, because the butchers might not come to London to buy dead meat, and that would very much increase the price of cattle, and consequently of meat, in their own districts.

4223. But you do not think that interfering with the traffic for two months is a question of large importance?—I do not think that it is material to the railway companies whether they carry the cattle or the dead meat. They would no doubt lose a certain amount of traffic if it was stopped in that way.

4224. So far as I understand you as regards the Metropolitan Market, two months would be represented by 800 trucks of live cattle going out of the market, so far as your railway is concerned?—Yes; the effect would be more upon the public than upon railway companies.

4225. Are your regulations at present, with regard to disinfecting, strictly carried out in every load of

* *See* Appendix C.

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cattle?—Yes; in accordance with the regulations which I have handed in.

4226. (*Chairman.*) (*To Mr. Allport.*) You are traffic manager of the Midland Railway?—Yes.

4227. Is there a large traffic in cattle on that railroad?—Yes; we have a large cattle traffic. I only heard last night that my attendance here to-day was required, and our head-quarters being at Derby I have not the means at hand to give the Commissioners the returns. Of course our cattle traffic is not at all equal to that of the London and North-western Railway Company; but still we have a large cattle traffic, more especially from the grazing districts of Derbyshire, Leicestershire, Northamptonshire, and Lincolnshire. We bring up a large quantity of cattle to London.

4228. It is principally fat cattle which you carry?—Entirely fat cattle to London. We of course carry a large quantity of lean cattle in various directions, and also a large quantity of fat cattle to the various towns.

4229. Will there be a large traffic in lean cattle for the next two months?—No; the lean cattle traffic is pretty well over for the season; certainly at the end of this month it will be over. All the fairs have been held both in Scotland and in the north of England, and I think that I may say that practically the lean cattle trade is over.

4230. Could you furnish the Commission with a return of the cattle which you bring into London and the cattle which you take out of London again?—Yes.

4231. And also a similar return to some of the principal towns through which your line runs?—That I can do.*

4232. Can you state whether the export traffic from London has diminished much since the Consolidated Order in Council with regard to animals coming only for slaughter to the Metropolitan Market?—We do not take much out of London; we do a little, but not any very great quantity. I do not think that that has interfered with it. I think that if there had been any diminution of the traffic either one way or the other I should have heard of it. I may state that there has been a falling off of the cattle traffic lately into London, and I think that almost all the railway companies will have found that there has been a very considerable falling off lately into London.

4233. How do you account for that?—I do not know whether it is from the diminished demand in consequence of the high price of meat in London, or from the fear which the farmers may have of sending their cattle into market, and losing them, but there has been a falling off. I may state that this last week, taking a monetary point of view, our cattle traffic, I think, was about 600*l.* as against 1,000*l.* in the corresponding week of last year, and that is principally in the direction of London. Our lean cattle traffic this year has been much larger. I think that by the last return which I have it appears that we have brought over already something like 20,000 head of lean cattle from Ireland by way of Morecambe.

4234. But that trade is principally over for the year?—Yes.

4235. Has the dead meat traffic increased?—No; that is very stationary. Perhaps I can explain the way that dead meat comes. In all our large manufacturing towns, wherever there is a poor population, of course there is a large demand for the inferior parts of the cattle, and you will find that the great bulk of the dead meat which comes to London consists of the best joints. They do not kill the carcases and send them up altogether, but they send the best joints. That applies to many of the towns upon the Midland Railway. From Leeds, for instance, and from that district, we bring a considerable quantity of dead meat to London, and also from

* The subjoined Returns were subsequently sent:—

RETURN showing the NUMBER of CATTLE, CALVES, PIGS, SHEEP, and HORSES carried upon the MIDLAND RAILWAY for the Month of September 1865.

Number of—

Cattle.	Calves.	Pigs.	Sheep.	Horses.
16,238	1,568	9,250	60,414	363

of which the following numbers were carried to and from the under-mentioned towns:

Places.	From.					To.				
	Cattle.	Calves.	Pigs.	Sheep.	Horses.	Cattle.	Calves.	Pigs.	Sheep.	Horses.
Birmingham	30	2	244	1,142	12	743	31	719	1,394	—
Sheffield	29	28	168	299	—	846	131	1,472	3,247	—
Leicester	1,156	—	94	3,311	—	942	3	1,422	3,102	—
Nottingham	189	4	86	1,294	—	171	73	544	2,712	—
Leeds	235	12	60	1,551	—	347	208	97	3,258	11
Derby	402	133	1,287	2,606	19	235	21	918	3,524	18
Market Harbro'	1,172	—	4	1,984	4	105	12	83	1,244	—
Kibworth	681	—	—	1,094	—	—	—	—	67	—
Bedford	42	170	499	370	—	124	137	237	1,005	—
London	—	—	12	3	—	3,049	2	—	4,579	30

RETURN showing the TOTAL NUMBER of CATTLE, SHEEP, and PIGS received at and forwarded from LEICESTER, by the MIDLAND COMPANY, during the year ending 30th September 1865.

Received at.			Forwarded from.		
Cattle.	Sheep.	Pigs.	Cattle.	Sheep.	Pigs.
11,823	55,930	18,990	18,766	26,495	1,290

RETURN showing the TOTAL NUMBER of CATTLE forwarded from BELFAST to MORECAMBE during the years—

1862.	1863.	1864.
36,413	36,142	23,932

Midland Railway, General Manager's Office,
Derby, 30th October 1865.

JAMES ALLPORT.

Lincolnshire, and from Derby, and from various places, the inferior joints being consumed by the population on the spot. Alluding to slaughtering cattle for the London market, instead of sending them alive, I do not think that it could by any possibility be carried out. Take the principal grazing county which we have, namely, Leicestershire; the traffic is carried on in the way which I will now explain. The farmers send their cattle to certain cattle dealers; they are loaded at small stations convenient to the farmers, and sent to London, or to the other large towns; but as to slaughtering those cattle, the farmer of course could not do it, and could not be expected to do it, and in any of the small towns or villages where these cattle are loaded you could not for months organize a system of slaughtering. Then when the cattle were slaughtered, what would you do with the skins? You have no means in the country of curing these skins, and they would have to be sent to London. It would throw such an immense increase of trade into the hands of the country dealers that they could not deal with it. I think that if you inquired into the details of such a trade for the supply of a population of three millions it would be be found utterly impracticable. Besides that, as Mr. Cawkwell very justly observes, the London market is on a Monday, and the butchers keep their cattle until they want them; but to regulate the supply of meat for London from the country would involve an amount of organization which, much as we railway men are accustomed to that sort of thing, I should shrink from.

4236. Your observation applies to the stoppage of all movement of cattle altogether; it does not apply merely to not allowing cattle to leave the town alive?—Leicester and Derby are very large cattle markets; the great bulk of the cattle sold in those two towns are not for the supply of the population in them. The farmers bring their cattle to those markets; cattle dealers and butchers from various parts of the country attend, and buy them to send to other towns and villages. Deducting the demand in Leicester, we have the same amount of cattle traffic from Leicester as into Leicester, and on market days our cattle traffic from Leicester is very large.

4237. To butchers in London and other towns?—Yes; to butchers and dealers; chiefly cattle dealers. Dealers attend from market to market, and take the cattle from Leicester to Birmingham, or from Leicester to Sheffield, or Nottingham, or to London.

4238. You therefore think that an order prohibiting cattle leaving Leicester alive would interfere greatly with the trade; and you would wish to see an alteration to the extent of allowing them to be removed alive to London and other towns?—Certainly. Leicestershire, as everyone knows, is a very important grazing country. The farmers could not take their cattle to Birmingham and to various other places. They would take them, as they have been accustomed to for years past, to the nearest market town; and their own market town, namely, Leicester. All the dealers and butchers attend and purchase them, and take them through the country; but to stop that trade it appears to me would be creating a great difficulty.

4239. Could you stop it so far as to prevent those cattle from returning to the farm, and mixing with other cattle; because we are told that the disease is greatly spread by animals going to market contracting the disease there, and then returning to the pastures, and affecting others?—I think that it is a very rare thing for cattle to return to the pastures. We carry a great deal to the various markets, but the cattle going from those markets are chiefly for consumption in towns. Very few cattle return to the grazier.

4240. But we are told that butchers often buy in London, and take the cattle to Birmingham, and keep them with other cattle for a few days, and that in that way they take the disorder?—I think that it is very likely that the butchers will do that. The butchers will take them from the London market, and from the Leicester market, and put them into pastures until they want to kill them.

4241. How would you stop that means of spreading the disorder? Have you thought of that at all?—I have; and it occurs to me that, as the disease has been more confined to the southern districts more immediately surrounding London, no great harm would result from live cattle not being sent out of London into the country for a period. It certainly would be interfering with trade, which is very undesirable; but it would not involve the same difficulties as stopping the live cattle going from all the market towns in the country.

4242. Take a town which is not in your district,—but take Norwich, where there has been a great deal of disease, and the Market Hill there is supposed to be very much infected; what would you do with respect to a place like Norwich?—I fancy that a proper system of inspection would prevent any spread of disease from Norwich. I am not aware of the particular trade of Norwich in cattle, but I should hardly think that there would be any very large quantity of cattle sent out of Norwich to various other markets. If you have an isolated case there, I think that you must apply a special remedy. I have made it my business to inquire lately from the cattle dealers in Leicestershire and Nottinghamshire, and throughout our districts, and I have not heard of a single case of disease being imported from London, although we do carry the cattle from London.

4243. But you are aware that in a great many parts of Scotland, and in almost every part of England, the disease now exists?—Yes; but to a very limited extent in the Midland counties.

4244. You would be inclined to prevent animals from leaving London alive, but would allow them to leave country markets?—If it was necessary to stop it at all, I should prevent it; but I have not yet heard sufficient to justify me in giving an opinion that it is necessary even to stop the trade from London. The disease, in my opinion, should increase very much more than it has done in order to justify so large an interference with the trade of the country as that.

4245. But you are aware that the longer the disease goes on the more difficult it is to find any measure which will stop it?—No doubt it is.

4246. Have many diseased cattle been seized at your stations?—We have not had one. We are carrying out the regulations very strictly, and I have not heard of a single case.

4247. What are those regulations?—I have not a copy of them with me, but they are very similar to those of the London and North-western Company. All the great companies have issued very similar regulations. We insist upon all the cattle pens being cleansed after each use. I will send to the Commissioners a copy of those regulations.*

4248. Have you any system of inspection at the stations where cattle are brought upon your line?—No; we discussed that very fully, but we found it impracticable. A station master at 25*s.* or 30*s.* a week would be quite incapable of judging of the state of the cattle, and to put an inspector at all our small stations would be impracticable.

4249. (*Dr. Playfair.*) If you allowed movement from such cattle markets as Leicester and Derby, how would you provide that such cattle should be immediately forwarded to a slaughtering market, and should not go back into meadows, so as to mix with other cattle?—I do not think that you could provide for it. The butchers in the various towns have not the means of keeping the cattle under cover until they require them. A butcher in Birmingham, for instance, will come to Leicester Market, and will buy 25 or 30, or 40 head of cattle; he must turn them out into pastures. He cannot have the grass cut and brought into the town, and if he could he has not the means of keeping the cattle under cover.

* *See* Appendix C.

W. Cawkwell, Esq. and J. Allport, Esq.

20 Oct. 1865.

4250. Then, such movement being allowed, is there any possibility of preventing the spread of infection? That is a question which I cannot answer. I am not sufficiently acquainted with the disease or its infectious nature to answer that question; but I know that both in Leicester and in Derby the corporation have appointed a very efficient system of inspection.

4251. Are you aware that no system of inspection can tell when the disease is in a state of incubation? —I am aware of that.

4252. You consider that at the present moment the Cattle Plague has not assumed the proportions which would justify extreme measures?—I think not.

4253. Are you aware that it is supposed that the spread of the Cattle Plague through almost all the counties of England, and through many of the counties of Scotland, has arisen from one diseased beast imported into the market in June?—I have heard that stated.

4254. Is it not likely that now, there being some thousands of diseased beasts, if motion of cattle is permitted much longer the disease will go on in a much larger proportion?—I fancy that the spread of this cattle disease is very similar to the spread of disease in the population. You find typhus fever, cholera, and a variety of diseases seize the population, and it will go to a certain extent, and then it gradually diminishes. I have read most of the accounts, and I have not yet read any satisfactory one of the origin of this disease. I am far from believing that the disease in England has been caused by one single head of cattle; but that is merely my own opinion, and an unprofessional opinion. I think that perhaps it is from something in the atmosphere. I firmly believe that if the disease was of such an infectious nature as to spread, as people sometimes believe, we must have had it throughout the vast herds of cattle in Leicestershire in former times, and to a very much larger extent. We may have had it in one or two isolated cases, but I have not heard of them, and I should have thought that it would have made its appearance in Leicestershire to a much greater extent than it has.

4255. Are you aware that in 1745, in spite of the very active measures of the Government of the time, the disease lasted in the country for about 12 years? —I am aware of that.

4256. And that it killed some hundreds of thousand head of cattle?—I am not aware of the number of cattle which it killed.

4257. Do you not think that with that experience before us some measures must now be taken to put a stop to this plague, even although they inconvenience transit throughout the country?—If it is a mere inconvenience of transit, no doubt it will be desirable to put a stop to it; but that is not the question. I think that it is a question of supply and demand; the people must be fed.

4258. Cannot people be fed under the system proposed, by sending live animals to a slaughtering market, or sending up dead meat where that is not possible?—I believe that before you could organize a system sufficiently extensive to supply the population of the country in a different manner from its present supply the thing would all be over.

4259. What is your reason for supposing that it will be over; is it the experience of the past, or the experience of foreign nations, or what?—Simply that I apprehend that people are now taking every possible pains, and I hope that science will step in and prevent the spread of the disease, or if it has spread will find out remedies. Surely science is in a much more advanced state now than it was in 1744, and I cannot think that a disease like the present, any more than typhus fever, can run its course unchecked by science.

4260. I suppose that science is not confined to England. Are you aware that the highest scientific authorities in Russia, all throughout Germany, in Holland, in Denmark, and in France, have devoted themselves to this subject for upwards of a century, and have yet found no cure for the disease, or means of stopping it, except extreme measures?—I have heard that that is so in Russia; I was not aware that it was so throughout Germany and France; it may be as you state.

4261. Are you aware of the existence of stringent regulations abroad with respect to the transit of cattle, when there is disease in the country?—I have seen those statements in the papers lately.

4262. Having thought of the subject, have you any other methods to recommend to the Commission by which to stop this disease, except interference with the free movement of cattle?—No; I have not paid sufficient attention to the matter to make any such suggestion; it is quite impossible for me to do so.

4263. (*Mr. M'Clean.*) If cattle were prevented from leaving London, do you think that it would interfere with the importation of foreign beasts?—It would interfere with their importation into the London market, certainly.

4264. That is the principal market for which they are sent over to England?—It is.

4265. Will it have a tendency to increase the price of food?—No doubt it would, and the cattle imported into London would go to the outports, and if the disease is brought into England by these foreign cattle it would tend to spread it still more; the cattle would still come, unless there was a prohibition altogether.

4266. (*Dr. Playfair.*) Would that be the case if the cattle were slaughtered at the outports?—If it was known generally that it was done I think that people would be afraid; they would say, "This is diseased meat;" and it would put a stop to the trade. I have no doubt but that would be the result.

4267. Must not people be fed?—Quite so; but people would rather go without food than eat diseased meat.

4268. (*Mr. M'Clean.*) Can you account for the high price of meat at the present time?—I fancy that it is because people are so much better off than they were, and every poor man is perhaps eating meat three or four times as often as he did 10 or 12 years ago.

4269. And more work is done in consequence?—I have no doubt that a great deal more work is done.

4270. (*Chairman.*) Do you get a large quantity of foreign cattle now from Hull?—No.

4271. (*Dr. Playfair.*) Do you think that the self-interest of the localities will induce them to co-operate vigorously in stopping this disease?—I think that it will; I think that that is now the tendency. An inspector frequently comes to me at Derby to consult with me, and I have letters from other inspectors in other districts, and they seem to be thoroughly alive to the importance of doing whatever they can to put a stop to the disease.

4272. Then you think that they would support the Government in any reasonable measures to put an end to the Cattle Plague?—I think that they would.

4273. (*Chairman*) (*To Mr. Cawkwell.*) Has the Cattle Murrain much affected your traffic?—I do not think it has.

4274. Has the recent Order in Council with regard to the Metropolitan Market checked your export from London of traffic in live cattle?—No; our export from London is increasing.

4275. In live stock?—Yes.

4276. Since this order was issued restricting the coming of animals to the market to those coming for slaughter?—Yes; our traffic is increasing out of London.

4277. (*Mr. M'Clean.*) That is because foreign cattle are coming in?—Yes, no doubt, and are taking the place of English cattle. Butchers now come from Wolverhampton and Birmingham to London to buy cattle, when they formerly did not do so, but bought them in their own neighbourhood.

4278. (*Chairman.*) Are most of these cattle marked with the ordinary slaughter mark which it

is customary to put upon animals going for slaughter in the Metropolitan Market ?—I do not know.

4279. (*Dr. Playfair.*) Cutting the hair from the tail ?—I am not aware of that.

4280. (*Chairman.*) Have many diseased cattle been seized upon your line ?—I am not aware of any instance but one, and that was at Northampton.

4281. That was done by your station-master reporting to the inspector when he saw an animal sick ?—It was. I think that there has been one other case of cattle being refused, but I do not remember at what place. Those are the only two instances which I know.

4282. Have you at all considered what remedy should be taken to get rid of this disease in the country ? — No ; I have nothing that I can recommend.

4283. (*Mr. M'Clean.*) Do you agree with Mr. Allport that the self-interest of the localities will be sufficient to stop the disease ?—I am quite sure that they are doing everything they can to stop it in all the districts connected with our railway. I am sure that every possible effort is made.

4284. (*Dr. Playfair.*) What has been the result of these efforts ?—The detection of diseased animals.

4285. But has the result been the extinction of the disease in the localities ?—I cannot tell. I am not aware that it has.

4286. (*Chairman.*) Would you consider it necessary for the trade that animals should be allowed to be taken from a country market alive to go to other markets ?—I think that it would be a very difficult thing to prevent it, or rather a very objectionable step to prevent it, and for the reason explained by Mr. Allport, namely, that the butchers buy more than from hand to mouth at the markets ; they do not slaughter the cattle as soon as they buy them, but keep them for a week or two, and slaughter them as they require them.

4287. Is not that one of the worst sources of the spread of the disease ?—No doubt it is ; but the difficulty is an interference with the custom of the trade, and the mode in which business is done.

4288. (*Dr. Playfair.*) Do you consider that this disease is a very serious thing for the country ?—No doubt it is.

4289. Do you consider that the measures hitherto had recourse to have stopped its spread over the country ?—The measures have not stopped it, but I do not think that the disease is spreading so fast as people expected that it would do.

4290. Have you any idea how far as it has spread over the country ?—I am aware that it has spread into Scotland.

4291. Are you aware that it has spread to upwards of 30 of the counties of England ?—I do not know to how many counties it has spread; but I know that it has spread over a great district of England, and also into Scotland north of Edinburgh. I know that it was so when I was in Scotland some months ago.

4292. (*Chairman.*) Have you a considerable trade with the eastern counties by Cambridge ?—We have a very considerable trade in lean cattle to the eastern counties district for feeding ; we have not much fat cattle coming back from there. I think that they are principally sent from that district to the London market.

4293. That trade is now over ?—Yes.

The witnesses withdrew.

Adjourned.

APPENDIX.

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Appendix A.

Returns furnished by S. Gibbins, Esq.

I.—Return showing the average approximate numbers of Cattle sold; (1) to be slaughtered in London; (2) to be slaughtered in the country; (3) for grazing; and the average number unsold.

	Before the Outbreak.	Since the Outbreak.
Number of Cattle ordinarily sold for slaughtering in London, about	3,000	3,300
Number of Cattle ordinarily sold for slaughtering in the country, about	1,000	1,500
Number of Cattle ordinarily sold for grazing, about	800	200
Average number unsold, about	700	500
Average number of Cattle in the Market, about	5,500	

II.—Like Returns for four weeks in October 1865.

	Number of Cattle sold to be slaughtered in London.	Number of Cattle sold to be slaughtered in the Country (including those whose Owners refused to allow them to be marked).	Number of Cattle unsold.	Total Number of Cattle in Market.	Number of Cattle whose Owners refused to allow them to be marked.
Monday, 2nd Oct., about	4,000	1,950	600	6,550	492
Thursday, 5th „ „	700	260	200	1,160	112
Monday, 9th „ „	3,500	1,963	367	5,830	463
Thursday, 12th „ „	650	266	274	1,190	126
Monday, 16th „ „	4,000	1,874	466	6,340	374

III.—Return showing the number of Foreign and English Cattle in the Market on each Market Day, from 1st January to 30th October 1865.

Monday.	English.	Foreign.	Thursday.	English.	Foreign.
Jan. 2	2,897	450	Jan. 5	489	121
„ 9	3,580	1,240	„ 12	1,030	560
„ 16	3,509	1,071	„ 19	690	520
„ 23	3,110	900	„ 26	707	617
„ 30	3,330	1,000	Feb. 2	620	520
Feb. 6	2,800	610	„ 9	370	950
„ 13	3,030	1,020	„ 16	980	350
„ 20	2,190	1,020	„ 23	690	470
„ 27	2,710	1,230	March 2	760	320
March 6	2,820	1,430	„ 9	400	720
„ 13	2,450	1,790	„ 16	610	750
„ 20	2,930	1,890	„ 23	522	798
„ 27	2,930	1,820	„ 30	500	750
April 3	2,970	1,210	April 6	270	520
„ 10	2,560	1,410	„ 13	550	440
„ 17	1,870	1,300	„ 20	730	410
„ 24	2,910	1,380	„ 27	780	500
May 1	1,820	1,990	May 4	604	646
„ 8	2,800	2,020	„ 11	410	450
„ 15	2,800	1,460	„ 18	510	360
„ 22	3,230	1,750	„ 25	570	570
„ 29	2,190	1,470	June 1	650	540
June 5	3,100	1,540	„ 8	760	380
„ 12	3,110	1,450	„ 15	590	700
„ 19	2,910	2,080	„ 22	987	863
„ 26	2,100	2,380	„ 29	600	1,420
	72,656	36,911		16,379	15,245

III.—Return, &c.—*continued.*

Monday.	English.	Foreign.	Thursday.	English.	Foreign.
July 3	2,000	3,040	July 6	590	670
„ 10	2,520	2,500	„ 13	500	610
„ 17	2,860	2,150	„ 20	650	630
„ 24	3,360	1,970	„ 27	760	550
„ 31	2,820	3,120	Aug. 3	470	520
Aug. 7	3,400	3,300	„ 10	580	950
„ 14	2,320	4,000	„ 17	510	580
„ 21	2,080	3,460	„ 24	440	620
„ 28	2,240	2,550	„ 31	600	590
Sept. 4	2,130	2,140	Sept. 7	480	1,180
„ 11	2,210	3,710	„ 14	560	520
„ 18	2,330	3,910	„ 21	480	230
„ 25	2,460	3,260	„ 28	695	395
Oct. 2	2,410	4,140	Oct. 5	700	460
„ 9	2,610	3,220	„ 12	410	780
„ 16	2,550	3,790	„ 19	450	710
„ 23	3,020	3,830	„ 26	860	690
„ 30	3,110	3,180			
1865 - Jan. to June	46,430 / 72,656	57,270 / 36,911	1865 - Jan. to June	9,735 / 16,379	10,685 / 15,245
Total -	119,086	94,181	Total -	26,114	25,930

		English.	Foreign.
Totals	Monday's market -	119,086	94,181
	Thursday's „ -	26,114	25,930
		145,200	120,111
Total number of beasts to October 30, 1865 -		265,311	

Number of Beasts sent to the Metropolitan Market in the Years 1862, 1863, 1864, and part of 1865.

	English.	Foreign.	Total.
1862 - -	249,051	51,466	300,517
1863 - -	229,392	80,238	309,630
1864 - -	220,294	119,174	339,468
1865 - - 10 months.	145,200	120,111	265,311 10 months.

Comparison of the Number in 1862 and 1865, from July 6 to October 26, 1865.

1865.	English.	Foreign.	1862.	English.	Foreign.
Week ending			Week ending		
July 6	2,590	3,710	July 5	3,720	1,070
„ 13	3,020	3,110	„ 12	3,763	1,767
„ 20	3,510	2,780	„ 19	4,060	1,560
„ 27	4,120	2,520	„ 26	3,709	1,751
Aug. 3	3,290	3,640	Aug. 2	4,212	1,823
„ 10	3,980	4,250	„ 9	5,272	1,418
„ 17	2,830	4,580	„ 16	4,474	1,526
„ 24	2,520	4,080	„ 23	4,514	1,226
„ 31	2,840	3,140	„ 30	4,579	1,816
Sept. 7	2,610	3,320	Sept. 6	5,327	1,633
„ 14	2,770	4,230	„ 13	4,816	1,834
„ 21	2,810	4,140	„ 20	5,630	2,120
„ 28	3,155	3,655	„ 27	5,180	1,920
Oct. 5	3,110	4,600	Oct. 4	5,280	2,220
„ 12	3,020	4,000	„ 11	5,070	2,050
„ 19	3,000	4,500	„ 18	4,900	2,540
„ 26	3,880	4,520	„ 25	5,350	2,030
	53,055	64,775		79,856	30,309
Total 4 mos. 1865	118,030		1862 -	110,165	

IV.—Return for Ten Weeks of Animals (1) sent out of the Market as diseased; (2) condemned as diseased; (3) seized in the Slaughter-houses; (4) condemned in the Slaughter-houses.

For the week ending.	Animals sent out of the market in consequence of having symptoms of the Cattle Plague on coming from infected sheds.	Animals condemned that have been sent out of the market.	Animals seized in the slaughter-houses.	Animals condemned in the slaughter-houses.
August 12	54	11	23	23
„ 19	48	12	65	65
„ 26	8	7	52	47
September 3	45	4	51	49
„ 10	26	11	26	22
„ 17	26	—	16	16
„ 24	2	2	17	13
October 1	9	2	6	6
„ 8	1	1	1	1
„ 15	—	—	2	2
	219	50	259	244

V.—Account of the Meat condemned in the City Markets as unfit for Human Food, during the Years 1861 to 1865, inclusive; from Returns by Dr. Letheby, the Medical Officer of Health for the City of London.

Years ending September.	Why condemned.															
	Newgate Market.				Aldgate Market.				Leadenhall Market.				Total.			
	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased.	Putrid.	Total.	Dead.	Diseased.	Putrid.	Total.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1861	25,843	65,467	12,056	103,366	2,323	7,115	1,885	11,323	5,453	18,516	2,800	26,769	33,619	91,098	16,741	141,458
1862	9,513	57,544	13,579	80,636	2,424	9,032	879	12,335	2,007	12,103	2,965	17,075	13,944	78,679	17,423	110,046
1863	15,780	86,280	52,493	154,553	1,458	6,446	2,851	10,755	3,086	21,394	20,717	45,197	20,324	114,120	76,061	210,505
1864	33,846	77,327	73,686	184,859	4,054	8,919	828	13,801	5,597	10,533	14,390	30,520	43,497	96,779	88,904	229,180
1865	19,669	91,444	77,981	189,094	5,547	22,384	3,517	31,448	2,177	10,786	14,322	27,285	27,393	124,614	95,820	247,827
Total in 5 Years	104,651	378,062	229,795	712,508	15,806	53,896	9,960	79,662	18,320	73,332	55,194	146,846	138,777	505,290	294,949	939,016

Years.	Kind of Meat condemned.															
	Newgate Market.					Aldgate Market.					Leadenhall Market.					Total.				
	Sheep and Lambs.	Calves.	Pigs.	Qrs. of Beef.	Joints	Sheep and Lambs.	Calves.	Pigs.	Qrs. of Beef.	Joints	Sheep and Lambs.	Calves.	Pigs.	Qrs. of Beef.	Joints	Sheep and Lambs.	Calves.	Pigs.	Qrs. of Beef.	Joints
1861	728	27	73	718	373	46	5	22	78	68	315	10	45	101	203	1,089	42	140	897	644
1862	402	31	97	539	592	48	—	10	86	46	92	3	42	93	128	542	34	149	723	766
1863	591	50	198	971	1,735	37	3	24	53	318	242	28	57	124	890	870	81	279	1,148	2,943
1864	776	42	322	1,097	1,888	34	3	49	83	52	165	11	75	110	773	975	56	446	1,290	2,713
1865	637	44	308	1,628	3,052	53	10	40	264	70	101	5	79	96	944	791	59	427	1,988	4,066
Total	3,134	194	998	4,953	7,640	218	21	145	564	554	915	57	298	529	2,938	4,267	272	1,441	6,046	11,132

Besides which, there were 7,928 lbs. of Meat seized in the Shops in the City. It consisted of 22 sheep, 5 pigs, 34 quarters of beef, and 291 joints and pieces of meat. 1,431 lbs. were diseased, 2,513 were putrid, and 3,984 were from animals that had died from disease.

VI.—Answers to Inquiries respecting (1) the quantity of Meat condemned in the City Markets; (2) the quantities of dead Meat sent into Newgate Market.

17, Sussex Place, Regent's Park, N.W.
October 23, 1865.

Dear Sir,

I regret that I have not had time until now to prepare a table of the meat condemned in the city markets during the last five years.

You will see by the enclosed that it amounts to nearly one mjllion pounds, or rather more than 418 tons. But large as this quantity is, it does not represent the actual amount which passes into the shops of the lower class of butchers; for not only does a good deal of meat escape the notice of the inspectors, but, in consequence of our vigilance in the city, and the almost total absence of inspection outside the boundary of the city, there is a regular trade in diseased meat immediately beyond the city. I regard this as a very serious evil; for it is not only the means whereby unwholesome meat reaches the poorer classes, but it is a hardship, in a certain sense, to the butchers within the city, who justly complain that they are closely watched, and are at any moment liable to a legal prosecution for that which their neighbours can do with impunity.

You will perceive in the accompanying table that the number of quarters of beef and of joints of meat (chiefly beef) is much greater in 1865 than in any other year; and I may explain it by saying that the increase has been chiefly during the last three months, on account of the Cattle Disease. In fact while the average amount of diseased meat condemned in a quarter is only about 25,264 lbs., and in the September quarter is only 18,878 lbs., last quarter it was 66,147 lbs.; all which excess was diseased beef. You will see, therefore, how, with all the Government Regulations, the meat of diseased animals has found its way into the public markets.

I hope by Tuesday to be able to send you the approximative returns of meat sent to the London markets.

Truly yours,
H. Letheby.

Samuel Gibbins, Esq.

Newgate Market,
October 20, 1865.

Sir,

In reply to yours of yesterday, I beg to state that there are not any official means whatever by which the amount of dead meat sent into Newgate-market can be ascertained, but in the year 1861 inquiries were made with reference to the "Bill" for dismarketing Newgate-market, and some rough calculations were then entered into; the result was that about 120,000 tons of dead meat were computed to be sent into Newgate-market annually.

Taking the above data, and the partial falling off in the supply for the last two years consequent on the scarcity of stock, I presume you may estimate the probable average amount of dead meat sent into Newgate-market for the years 1862, 1863, and 1864 as about the amount above mentioned (say 120,000 tons), of which amount probably from one-fifth to one-fourth would be slaughtered in London.

I am, Sir,
Your obedient servant,
Charles Fisher.

Samuel Gibbins, Esq.

Appendix B.

Paper furnished by Mr. Taylor, Customs' Inspector at Harwich, showing the Regulations, &c. respecting Cattle Importation at Harwich.

HARWICH.

Accommodation for Foreign Cattle and Regulations observed on their Importation at Harwich.

Accommodation.—The vessels are constructed and fitted specially for the conveyance of cattle, as well as other cargo.

There are dry, well drained, and ventilated lairs, supplied with water, and the cattle pens, besides being well drained and spacious, are supplied with iron water troughs.

There are sheds on the Company's premises for the temporary housing of suspected cattle, approached without passing over any public road or thoroughfare.

There is a convenient and well drained slaughter-house at hand, but clear of the other premises, and a burial ground for condemned cattle or meat on railway ground, seven miles distant, where the Company have also agreed to deposit all the manure from the ships and lairs.

Regulations observed on arrival of a Cargo.—There is a Cattle Inspector attached to the Customs' staff, who is a member of the College of Veterinary Surgeons, and attends the arrival of every cargo.

Should a cargo arrive before evening, the animals are examined and passed at once, when they are either taken to the lairs and provided with hay and water, or to the pens (which are also provided with water), preparatory to being trucked and sent away. If arriving too late for a careful examination before dark, they are housed in the lairs till the following morning, provided with hay and water, as before stated; after being examined by the veterinary surgeon at daylight, and passed, are trucked and sent to their destination.

Animals bruised or seriously hurt are at once slaughtered in the Company's slaughter-house, and, together with any found dead, are, after inspection by the veterinary surgeon, if certified as fit for human food, delivered; but if otherwise, both carcases and hides are destroyed, by being saturated with carbolic acid, under the supervision of a customs officer, and, if decomposed, sent in charge of such officer to the burial ground before mentioned, and interred six feet deep, as would be the case with any showing symptoms of a contagious or infectious disorder; but none such have as yet arrived.

Should any cattle, &c. arrive with suspicious symptoms, but not sufficiently defined as to warrant the use of the knife, they would be removed to the building set apart for such a contingency, and subsequently be delivered, or slaughtered and buried, as the event might justify; but should a single animal affected with the plague arrive it would be destroyed and buried, and all those imported in the same ship detained and kept apart for so long a period as the customs authorities might deem necessary or expedient.

Ships.—On discharge of a cargo the steamers from the deck to the lower hold are scraped, flushed by means of a steam hose, and lime-washed, when they are inspected by a customs officer on being officially cleared for another voyage.

Trucks.—The trucks conveying cattle arriving from the continent are kept separate from all others, and cleaned and lime-washed after every journey.

Lairs.—The lairs are regularly lime-washed and the litter removed, when they are thoroughly cleansed and fresh litter laid down.

Finally—the whole are supervised by the officers of customs and their cattle inspector.

J. W. Wood,
Collector of Customs.

(Agreed) J. G. Powers,
Continental Traffic Manager, Great Eastern Railway.

Customs, Harwich, Aug. 26, 1865.

Appendix C.

Regulations respecting Cattle Traffic, referred to in the Evidence of J. Allport and W. Cawkwell, Esqrs.

Midland Railway, Goods Managers' Office,
Derby, August 17, 1865.

Dear Sir,

To prevent as much as possible the spread of the Cattle Disease, the Company have been requested to adopt such measures as may be necessary to cleanse the cattle waggons and cattle docks used on this railway, and with this view I am instructed to request that you will, after receipt hereof, cause every cattle waggon arriving at your station loaded to be well washed when unloaded, and then to be further washed with lime water; the proportion o lime and water to be about the same as used for white-washing.

Your cattle docks must also be cleansed daily, and the ground within the railing carefully cleared of any manure deposited on it, and then sprinkled over with slacked lime; about two or three pounds being used to each separate pen.

You may get the lime at your station or in the neighbourhood, and send us the bill for what you have used at the close of each month, until you receive further instructions.

Yours truly,
THOS. WALKLATE,
per E. C. HEWES.

Midland Railway, Goods Managers' Office,
Derby, October 7, 1865.

Dear Sir,

In reference to our circular of the 17th August, Instructing you to have all cattle waggons cleansed when unloaded, please note that the instructions will also apply to sheep vans or cattle waggons loaded with sheep.

Acknowledge receipt.

Yours truly,
THOS. WALKLATE,
per W. FEAST.

London and North-western Railway.

(Circular, No. 549 A.)

To the Cattle Traffic Superintendent, the District Goods Managers, Agents, and others concerned.

The attention of the Directors having been drawn to the prevailing Cattle Murrain, and to the necessity of taking all reasonable precautions in the case of live stock entrusted to the London and North-western Railway Company for conveyance, they have decided to give immediate effect to the following regulations, which it is hoped may have the effect of limiting the spread of the infection:—

1. That no live-stock presenting manifest symptoms of disease, similar in appearance to those of the Cattle Plague, be received for carriage at any of the Company's stations.
2. That the cattle-pens at the stations be whitewashed, and also cleansed and purified immediately after the removal of each lot of live-stock.
3. That the cattle waggons be thoroughly cleansed and purified immediately after each journey.
4. That chloride of lime, whitewash, or other approved disinfectants, be used in the cleansing and purifying of the pens and waggons.

Mr. Salmon to take steps, in concert with the divisional traffic superintendents and district goods managers, to carry these arrangements into immediate operation.

W. CAWKWELL,
General Manager's Office, General Manager.
Euston Station, London, N.W.
19th August 1865.

This circular to be substituted for Circular No. 549, dated 14th August, on the same subject.

London and North-western Railway.

(Circular, No. 552.)

Cattle Plague.

In the event of infected cattle reaching any of the Company's stations from stations on the London and North-western line, or from foreign companies' lines, the agents must lose no time in communicating, where possible, with the municipal authorities of the place, in order that the cattle may be subjected to the inspection of the proper officer.

In case the municipal authorities decline to act, or no local authorities can be found to act, the agent is authorized to employ a veterinary surgeon to inspect the suspected animals; and in the event of his report confirming the suspicions of the agent, the agent is to lose no time in having the infected animals killed and buried, and the trucks purified and cleansed, in terms of the order contained in Circular No. 549 A.

Cattle proved to be infected arriving at London and North-western stations must, on no account, be returned along the railway to the sending station. Such cattle must be destroyed, under the orders either of the municipal authorities, of the veterinary surgeon employed by the Company's agent, or in cases of emergency, of the agent himself.

Great care must be taken that all cleaning materials used in sweeping or cleansing cattle waggons or pens which have been occupied by diseased cattle should not be again used until they have been subjected to a disinfecting process. The same observation applies to the clothes worn by porters and loaders who have come in contact with infected cattle, or the trucks in which infected cattle have travelled.

W. CAWKWELL,
General Manager's Office, General Manager.
Euston Station, London, N.W.,
August 26, 1865.

APPENDIX D.

RETURNS of FOREIGN CATTLE and SHEEP imported into the United Kingdom between the Years 1860–64, and in the first Nine Months of 1865.

Cattle Plague Commission,
2, Victoria Street, Westminster, S.W.

Gentlemen,

19th October 1865.

I am directed by Her Majesty's Commissioners for inquiring into the nature and treatment of the Cattle Plague to request that the Board of Trade will have the goodness to furnish them with the following information if it is in the power of the Board to do so, viz.:

1. A return showing the total numbers of foreign horned cattle and of foreign sheep imported into the United Kingdom during the period from 1860 to 1865, both inclusive, up to the latest possible date in the latter year; showing also the ports of importation, and the numbers landed at each port.
2. A return showing the ports or places at which such cattle and sheep were respectively shipped, and, if possible, the countries or places from which they came.

I am, &c.,
The Joint Secretaries to the Board of Trade. MOUNTAGUE BERNARD.

Office of Committee of Privy Council for Trade.

Sir,

Whitehall, 15th November 1865.

In compliance with the request contained in your letter of the 19th ultimo, I am directed by the Lords of the Committee of Privy Council for Trade to enclose for the use of the Cattle Plague Commission the accompanying particulars relative to the importation of foreign horned cattle and sheep into this country, which they have obtained from the Commissioners of Customs.

I am, &c.,
The Secretary to the Cattle Plague Commission. J. EMERSON TENNENT.

RETURNS OF FOREIGN CATTLE and SHEEP Imported into the UNITED KINGDOM between the Years 1860—64, both inclusive, and in the first Nine Months of 1865.

1. OXEN and BULLS.

Countries from which Imported into England, Scotland, and Ireland severally.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
From Russia: Ports within the Baltic	20	—	2	—	—	321
„ Sweden: Ports without the Baltic	—	—	3	—	—	1,096
„ Norway	—	—	9	—	—	48
„ Denmark	24,329	—	357	—	—	2,128
„ Duchies of Slesvig and Holstein		22,536	22,778	27,853	30,448	16,928
„ Iceland, Faroe Islands, and Greenland	—	—	—	3	—	—
„ Prussia	—	—	—	—	1	—
„ Hanover	—	—	—	—	38	140
„ Oldenburg and Kniphausen	431	298	—	—	—	1
„ Hamburg	7,665	7,228	2,347	6,920	11,619	17,584
„ Bremen	2,497	3,352	2,398	4,713	6,179	3,582
„ Holland	20,706	19,363	18,551	43,276	77,481	45,733
„ Belgium	126	132	93	677	3,679	10,426
„ Channel Islands	—	—	—	4	—	—
„ France: Ports without the Mediterranean	5,506	4,599	2,077	2,370	2,760	7,910
„ Portugal	4,397	4,933	8,804	5,045	5,790	2,905
„ Spain: Ports without the Mediterranean	3,573	8,360	6,767	6,433	8,212	6,127
„ —— Ports within the Mediterranean		236	20	118	33	—
„ Egypt	4	—	—	—	—	—
„ Algeria	—	—	—	—	149	—
„ British India: Madras	—	—	4	—	—	—
„ United States of America: On the Atlantic Northern Ports	—	12	—	—	—	—
	69,254	71,049	64,210	97,412	146,389	114,929
SCOTLAND.						
From Russia: Ports on the White Sea	—	—	—	—	—	4
„ Denmark	6	—	—	—	—	2,824
„ Duchies of Slesvig and Holstein		—	—	—	—	—
„ Iceland, Faroe Islands, and Greenland	1	—	7	—	9	6
„ Prussia	—	—	—	—	—	5
„ Hamburg	762	239	244	1,229	2,860	2,219
„ Holland	—	—	—	—	357	45
„ Portugal	—	—	—	—	156	184
„ Spain: Ports without the Mediterranean	—	—	—	—	36	—
	769	239	251	1,229	3,418	5,287
IRELAND.						
From Holland	—	—	—	—	—	5
„ Portugal	—	—	—	—	794	552
„ Spain: Ports without the Mediterranean	—	—	—	5	—	—
„ —— Ports within the Mediterranean	—	—	—	10	—	—
	—	—	—	15	794	557
UNITED KINGDOM	70,023	71,288	64,461	98,656	150,601	120,773

Ports of England, Scotland, and Ireland into which Imported.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
London	52,128	54,417	50,554	81,618	115,219	74,098
Arundel	—	—	—	—	4	441
Carliff	—	40	—	—	—	—
Dartmouth	32	—	40	40	—	—
Falmouth	1,615	1,406	805	718	1,955	2,781
Goole	208	185	24	—	—	6
Grimsby	522	9	—	322	248	403
Hartlepool	795	56	40	246	910	952
Harwich	—	—	—	1,142	11,712	15,417
Hull	3,490	2,147	344	3,801	6,603	11,634
Liverpool	1,685	2,966	5,336	4,473	3,446	2,378
Lowestoft	1,416	260	—	433	66	20
Lynn	131	—	—	—	—	—
Newcastle	1,146	186	97	400	940	1,400
Newhaven	12	—	6	5	—	44
Penzance	—	30	—	—	58	264
Plymouth	4,621	5,297	2,713	1,972	2,719	2,493
Poole	—	—	—	—	—	21
Portsmouth	—	36	—	—	—	—
Shields	—	—	—	—	—	22
Southampton	1,953	3,923	4,251	2,241	2,509	2,539
Sunderland	—	—	—	—	—	16
Teignmouth	—	72	—	—	—	—
Weymouth	—	—	—	1	—	—
Yarmouth	—	19	—	—	—	—
	69,254	71,049	64,210	97,412	146,389	114,929
SCOTLAND.						
Dundee	—	—	—	63	151	4
Glasgow	—	—	—	—	192	184
Grangemouth	676	239	244	—	—	437
Kirkaldy	47	—	—	—	—	—
Kirkwall	—	—	7	—	—	6
Leith	46	—	—	1,166	3,075	4,656
	769	239	251	1,229	3,418	5,287
IRELAND.						
Dublin	—	—	—	—	794	557
Waterford	—	—	—	5	—	—
Wexford	—	—	—	10	—	—
	—	—	—	15	794	557
UNITED KINGDOM	70,023	71,288	64,461	98,656	150,601	120,773

Foreign Cattle and Sheep Imported into the United Kingdom—*continued.*

2. COWS.

Countries from which Imported into England, Scotland, and Ireland severally.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
From Russia: Ports within the Baltic	2	1	1	1	—	—
„ Sweden: Ports without the Baltic	1	—	—	—	—	9
„ Norway	—	—	49	5	1	11
„ Denmark	757	—	—	—	—	238
„ Duchies of Slesvig and Holstein		685	399	568	591	207
„ Hanover	—	—	—	—	166	266
„ Oldenburg and Kniphausen	—	—	—	—	—	3
„ Hamburg	328	153	15	611	2,703	5,856
„ Bremen	32	—	13	321	1,383	3,469
„ Holland	4,931	8,368	2,945	8,029	21,973	11,209
„ Belgium	20	—	8	10	41	431
„ Channel Islands	—	—	—	11	47	—
„ France: Ports without the Mediterranean	899	629	831	805	891	1,211
„ Portugal	—	20	—	—	9	—
„ Spain: Ports without the Mediterranean	—	—	—	—	32	—
„ British India: Madras	—	1	6	—	—	—
„ ——— Bengal and Pegu	—	—	—	1	—	—
„ China	—	—	—	1	—	—
„ British North America: Prince Edward Island	—	—	1	—	—	—
SCOTLAND.	6,970	9,857	4,268	10,363	27,837	22,910
From Denmark	—	—	—	—	1	1,003
„ Iceland, Faroe Islands, and Greenland	—	—	—	21	—	12
„ Hamburg	17	48	89	609	403	996
„ Holland	—	1	—	4	665	656
IRELAND.	17	49	89	634	1,069	2,667
From Holland	—	—	—	—	—	5
„ Portugal	—	—	—	—	—	4
	—	—	—	—	—	9
UNITED KINGDOM	6,987	9,906	4,357	10,997	28,906	25,586

Ports of England, Scotland and Ireland into which Imported.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
London	2,012	5,692	1,459	2,231	1,789	1,377
Arundel	—	—	—	—	183	199
Bristol	—	—	—	—	2	—
Cardiff	—	24	—	—	—	—
Dartmouth	33	34	24	—	—	—
Dover	—	—	—	—	—	8
Exeter	26	—	—	18	—	44
Falmouth	19	30	193	269	500	571
Folkestone	—	—	34	—	—	—
Fowey	—	—	60	65	—	19
Goole	1,365	1,665	832	2,860	4,063	1,924
Grimsby	2	—	—	—	1	13
Hartlepool	162	53	—	130	830	1,232
Harwich	—	—	—	757	3,153	1,910
Hull	2,473	1,833	1,194	3,627	15,364	12,998
Ipswich	—	—	48	—	—	—
Liverpool	—	4	1	3	120	—
Lowestoft	26	—	—	5	—	—
Lyme	—	—	35	—	—	—
Lynn	15	—	—	—	—	—
Newcastle	19	—	—	35	1,596	2,211
Newhaven	342	145	174	164	115	60
Penzance	—	—	—	—	1	20
Plymouth	78	12	72	94	5	140
Poole	—	—	—	—	1	4
Portsmouth	24	—	7	—	—	—
Rye	—	—	74	—	38	28
Scarborough	30	—	28	—	—	—
Shields	—	—	—	—	—	30
Southampton	242	130	33	88	75	83
Sunderland	—	—	—	—	—	4
Swansea	—	—	—	—	1	—
Teignmouth	—	146	—	—	—	—
Weymouth	102	89	—	17	—	35
SCOTLAND.	6,970	9,857	4,268	10,363	27,837	22,910
Dundee	—	—	—	—	—	198
Grangemouth	—	18	38	—	—	280
Kirkaldy	—	—	—	21	—	—
Kirkwall	—	—	—	—	—	12
Leith	17	31	51	613	1,069	2,177
IRELAND.	17	49	89	634	1,069	2,667
Dublin	—	—	—	—	—	9
	—	—	—	—	—	9
UNITED KINGDOM	6,987	9,906	4,357	10,997	28,906	25,586

FOREIGN CATTLE and SHEEP imported into the UNITED KINGDOM—*continued.*

3. CALVES.

Countries from which Imported in England, Scotland, and Ireland, severally.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
From Russia: Ports within the Baltic	—	—	—	—	—	—
„ Sweden: Ports without the Baltic	—	—	6	—	—	2
„ Denmark	8	—	—	—	—	42
„ Duchies of Slesvig and Holstein		6	3	7	7	3
„ Russia	6	—	—	—	—	—
„ Hanover	17	—	—	—	3	6
„ Oldenburg and Kniphausen	1	—	—	—	—	—
„ Hamburg	131	1	—	42	1,487	944
„ Bremen	—	—	—	—	9	1,017
„ Holland	24,244	23,298	26,686	36,837	45,503	35,882
„ Belgium	2,414	1,869	1,984	3,732	4,624	2,624
„ France: Ports without the Mediterranean	37	726	389	616	496	946
„ Portugal	—	—	—	—	1	—
„ British India: Madras	—	1	1	—	—	—
	27,558	25,901	29,069	41,234	52,130	41,466
Into SCOTLAND.						
From Denmark	—	—	—	—	—	58
„ Hamburg	1	1	—	11	29	3
„ Holland	—	—	—	—	42	11
	1	1	—	11	71	72
Into IRELAND.						
From Portugal	—	—	—	—	25	27
UNITED KINGDOM	27,559	25,902	29,069	41,245	52,226	41,565

Ports of England, Scotland, and Ireland into which Imported.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
London	22,774	21,509	25,168	30,919	29,961	20,439
Arundel	—	—	—	—	12	5
Cowes	—	10	—	—	—	—
Dartmouth	7	4	—	—	—	—
Dover	—	—	—	—	33	33
Exeter	2	—	—	2	—	1
Falmouth	17	43	16	7	3	22
Fowey	—	—	6	2	4	9
Goole	684	632	668	955	1,366	1,151
Hartlepool	6	—	—	12	1,360	1,238
Harwich	—	—	—	2,769	10,853	9,993
Hull	3,556	3,375	3,037	6,211	8,227	7,929
Ipswich	—	—	8	—	—	—
Liverpool	—	1	—	—	—	—
Lowestoft	—	—	—	88	—	—
Lyme	—	—	3	—	—	—
Lynn	—	—	—	—	—	—
Middlesborough	—	—	—	2	—	—
Newcastle	2	—	—	—	78	160
Newhaven	3	10	2	6	6	174
Penzance	—	—	—	—	1	—
Plymouth	356	234	120	225	128	145
Poole	—	—	—	—	—	1
Portsmouth	—	14	—	—	—	—
Rye	—	—	9	—	1	—
Scarborough	1	—	2	—	—	—
Shields	—	—	—	—	—	14
Southampton	147	18	30	33	97	124
Teignmouth	—	41	—	—	—	—
Weymouth	3	10	—	3	—	28
	27,558	25,901	29,069	41,234	52,130	41,466
Into SCOTLAND.						
Dundee	—	—	—	—	—	11
Grangemouth	—	1	—	—	—	—
Leith	1	—	—	11	71	61
	1	1	—	11	71	72
Into IRELAND.						
Dublin	—	—	—	—	25	27
UNITED KINGDOM	27,559	25,902	29,069	41,245	52,226	41,565

Foreign Cattle and Sheep Imported into the United Kingdom—*continued.*

4. SHEEP.

Countries from which imported into England, Scotland, and Ireland, severally.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
From Russia: Ports within the Baltic	4	—	—	1	—	331
„ Sweden: Ports without the Baltic	8	17	—	50	—	534
„ Norway	180	88	48	—	—	19
„ Denmark	23,704	2	—	—	—	831
„ Duchies of Slesvig and Holstein		21,942	22,317	31,875	29,853	22,822
„ Prussia	—	46	—	—	—	—
„ Hanover	60	3	—	—	3	10
„ Oldenburg and Kniphausen	357	—	—	—	—	—
„ Hamburg	122,203	84,598	69,260	155,651	170,147	189,239
„ Bremen	671	1,133	77	3,421	2,005	9,462
„ Holland	156,037	183,954	183,537	203,370	249,642	138,573
„ Belgium	633	30	68	1,016	7,407	90,692
„ France: Ports without the Mediterranean	1,166	1,901	736	439	1,264	16,774
„ Portugal	217	115	15	14	—	31
„ Azores	—	6	—	—	—	—
„ Spain: Ports without the Mediterranean	—	13	4	12	—	5
„ Greece	1	—	—	—	—	—
„ Turkish Dominions, Natolia or Asia Minor	—	32	—	—	—	—
„ ——— Egypt	3	—	1	—	2	—
„ British Possessions in South Africa	—	—	—	—	—	—
„ Cape of Good Hope	—	—	—	—	1	—
„ British India: Bengal and Pegu	—	—	—	1	—	—
„ China	4	—	15	—	—	—
„ British Australia: New Zealand	—	28	—	—	—	—
„ Argentine Confederation	—	—	—	—	—	170
	305,248	293,908	276,078	395,850	460,324	469,493
SCOTLAND.						
From Denmark	—	—	—	—	727	3,704
„ Duchies of Slesvig and Holstein	—	—	—	—	53	—
„ Iceland: Faroe Islands and Greenland	2	2	1	3	—	2
„ Prussia	—	9	—	—	—	—
„ Hamburg	172	—	—	6,756	17,216	21,075
„ Holland	—	—	—	—	27	71
	174	11	1	6,759	18,023	24,852
IRELAND.						
From Holland	—	—	—	—	—	46
UNITED KINGDOM	305,422	293,919	276,079	402,609	478,347	494,391

Ports of England, Scotland, and Ireland into which imported.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
London	273,152	273,121	267,122	313,677	322,409	246,503
Arundel	—	—	—	—	—	311
Dartmouth	21	—	—	—	—	—
Dover	—	—	—	—	1	12
Falmouth	37	—	—	—	12	8
Folkestone	—	—	135	—	—	—
Goole	10	201	148	2,031	284	666
Grimsby	2,061	5	—	8,090	31,558	39,189
Hartlepool	1,391	564	764	16,073	24,052	24,339
Harwich	6	—	—	9,532	37,082	92,349
Hull	19,738	16,452	6,338	34,639	37,582	50,831
Liverpool	155	115	15	7	64	201
Lowestoft	1,054	35	—	1,788	12	—
Lynn	135	—	—	—	—	—
Newcastle	6,896	3,115	1,444	9,842	7,200	10,553
Newhaven	—	—	16	94	4	158
Plymouth	526	241	4	2	—	86
Poole	—	—	—	—	—	1,246
Portsmouth	13	—	—	—	—	—
Southampton	47	18	72	73	64	3,031
Sunderland	—	2	—	2	—	10
Teignmouth	—	24	—	—	—	—
Weymouth	6	—	—	—	—	—
Yarmouth	—	15	20	—	—	—
	305,248	293,908	276,078	395,850	460,324	469,493
SCOTLAND.						
Grangemouth	45	2	1	—	—	5,287
Kirkaldy	45	—	—	3	—	—
Kirkwall	—	—	—	—	—	2
Leith	84	9	—	6,756	18,023	19,563
	174	11	1	6,759	18,023	24,852
IRELAND.						
Dublin	—	—	—	—	—	46
UNITED KINGDOM	305,422	293,919	276,079	402,609	478,347	494,391

FOREIGN CATTLE and SHEEP Imported into the UNITED KINGDOM—*continued.*

5. LAMBS.

Countries from which Imported into England, Scotland, and Ireland, severally.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
From Sweden: Ports without the Baltic	1	—	—	—	—	—
„ ——— Ports within the Baltic		—	—	—	—	—
„ Norway	136	—	—	5	1	—
„ Denmark	4,345	—	—	—	—	1,159
„ Duchies of Slesvig and Holstein		4,072	3,907	6,029	6,102	2,115
„ Hanover	8	4	—	—	—	—
„ Hamburg	7	4	50	—	35	381
„ Bremen	—	—	—	7	14	412
„ Holland	10,284	14,923	19,433	22,071	11,537	7,360
„ Belgium	—	—	—	54	24	12
„ France: Ports without the Mediterranean	16	—	—	1	141	162
„ China	—	—	3	—	—	—
„ Australia: New Zealand	—	1	—	—	—	—
	14,797	19,004	23,393	28,167	17,854	11,601
Into SCOTLAND.						
From Denmark	—	—	—	—	—	1,207
„ Iceland, Faroe Islands, and Greenland	—	—	—	—	—	9
„ Hamburg	—	—	—	—	42	—
„ Holland	—	—	—	12	—	—
	—	—	—	12	42	1,216
Into IRELAND.						
From Holland	—	—	—	—	—	1
UNITED KINGDOM	14,797	19,004	23,393	28,179	17,896	12,818

Ports of England, Scotland, and Ireland into which Imported.	Years. 1860.	1861.	1862.	1863.	1864.	Nine Months ended 30 Sept. 1865.
Into ENGLAND.	Number.	Number.	Number.	Number.	Number.	Number.
London	14,032	18,635	23,296	27,888	17,102	8,130
Dartmouth	12	—	—	—	—	—
Dover	—	—	—	—	81	—
Goole	—	—	7	127	31	39
Grimsby	1	—	—	—	—	—
Hartlepool	4	4	3	—	118	316
Harwich	—	—	—	—	223	2,031
Hull	317	365	87	144	299	590
Lowestoft	431	—	—	—	—	—
Newcastle	—	—	—	—	—	492
Shields	—	—	—	—	—	3
Sunderland	—	—	—	8	—	—
	14,797	19,004	23,393	28,167	17,854	11,601
SCOTLAND.						
Kirkwall	—	—	—	—	—	9
Leith	—	—	—	12	42	1,207
	—	—	—	12	42	1,216
IRELAND.						
Dublin	—	—	—	—	—	1
UNITED KINGDOM	14,797	19,004	23,393	28,179	17,896	12,818

SUMMARY of the preceding ACCOUNT.

	Neat Cattle.				Sheep and Lambs.		
	Oxen and Bulls.	Cows.	Calves.	Total of Neat Cattle.	Sheep.	Lambs.	Total.
	Number.	Number.	Number.	Number.	Number.	Number.	Number.
Neat Cattle and Sheep imported into the United Kingdom - Years 1860 -	70,023	6,987	27,559	104,569	305,422	14,797	320,219
1861 -	71,288	9,906	25,902	107,096	293,919	19,004	312,923
1862 -	64,461	4,357	29,069	97,887	276,079	23,393	299,472
1863 -	98,656	10,997	41,245	150,898	402,609	28,179	430,788
1864 -	150,601	28,906	52,226	231,733	478,347	17,896	496,243
1865 to 30 Sept. -	120,773	25,586	41,565	187,924	494,391	12,818	507,209

NUMBER in each Month of 1865.—NEAT CATTLE.

January - - - -	4,836	June - - - -	27,108
February - - -	14,894	July - - - -	26,414
March - - - -	13,674	August - - -	35,285
April - - - -	13,408	September - - -	33,048
May - - - -	19,257		

Office of the Inspector General of Imports and Exports, Custom House, London, 9th November 1865.

(Signed) JOHN A. MESSENGER.

APPENDIX E.

CORRESPONDENCE with the BOARD OF TRADE as to Returns of Cattle within the United Kingdom.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10).
Westminster, S.W.
24th October 1865.

SIR,

I AM desired, by Her Majesty's Commissioners for inquiring into the origin, nature, and treatment of the Cattle Plague, to represent to you, as President of the Board of Trade, the importance of obtaining correct information respecting the number of horned cattle and sheep existing in the country.

Such returns, if they were in existence, would be valuable on the present occasion.

I may mention that the Government of the Netherlands, which is in possession of returns of this kind, is thereby enabled to publish weekly an exact statement, not only of the positive but of the proportionate loss in every commune which has been attacked by the disease. Such a statement could not be published here.

This, however, is by no means the only way in which such information would be useful.

I have, &c.
MOUNTAGUE BERNARD.

Right Hon.
T. Milner Gibson, M.P.,
Board of Trade.

Office of Committee of Privy Council for Trade,
Whitehall, 3d November 1865.

SIR,

I AM directed, by the Lords of the Committee of Privy Council for Trade, to acknowledge the receipt of your letter of the 24th ultimo, addressed to the President of the Board of Trade, by desire of Her Majesty's Commissioners for inquiring into the origin, nature, and treatment of the Cattle Plague, to represent the importance of obtaining correct information respecting the number of horned cattle and sheep existing in the country.

The representation of the Commissioners has received the prompt and anxious consideration of my Lords, and they entirely concur with Her Majesty's Commissioners as to the importance of ascertaining the stock of Cattle existing in this country.

If such information were obtained it could not fail to be of great utility and interest at the present time to the agriculturists, as well as to the public at large.

It appears that this country is almost exceptional in not possessing returns of the number of its Cattle.

Unfortunately it is for the chief division of the United Kingdom, England and Wales, that there is an entire absence of information, upon which reliance can be placed, as to the stock of Cattle. Returns of the live stock in Ireland are annually obtained, and the number in Scotland was ascertained in the years 1855–6 and 7.

The farmers in Ireland and Scotland have readily furnished this information by voluntary returns, and it is only in a similar way that the same particulars could at present be collected for England and Wales.

The Lords of the Committee of Privy Council for Trade are most desirous to promote the inquiry proposed by Her Majesty's Commissioners, and will take immediate steps to invite the co-operation of English agriculturists in a work of such manifest interest and importance.

I am, therefore, to request you will inform Her Majesty's Commissioners that orders will forthwith be given for the preparation and distribution of schedules for ascertaining the number of each kind of live stock in Great Britain. The inquiry will be extended to Scotland in order to obtain the information for the three divisions of the United Kingdom at one time.

The number of live stock belonging to individual persons will not be divulged.

Aggregate returns of stock will be prepared for specified districts, and such results only will be printed and published by the Board of Trade.

I have, &c.
J. EMERSON TENNENT.

To Mountague Bernard, Esq., &c. &c. &c.

APPENDIX F.

REGULATIONS or ORDERS of some FOREIGN GOVERNMENTS for the Prevention or Extirpation of the CATTLE PLAGUE.

FRANCE.

(*Transmitted by Earl Cowley.*)

Circular of the Minister of Agriculture.

Paris, le 11 Septembre 1865.

Monsieur le préfet, vous n'ignorez pas qu'une épizootie que l'on appelle en France *typhus contagieux des bêtes à cornes, rinder-pest* en Allemagne, et *cattle plague* en Angleterre, exerce depuis deux mois des ravages dans ce dernier pays, où elle s'est répandue de proche en proche en irradiant de la métropole, son foyer primitif, jusqu'en Ecosse, où elle a fait périr déjà beaucoup de bestiaux, notamment dans les laiteries d'Edinbourg.

De la Grande-Bretagne, où elle était restée confinée pendent les premières semaines qui ont fait suite à son invasion, l'épizootie s'est propagée en Hollande, et de la Hollande en Belgique.

La France est donc aujourd'hui ménacée. Il est urgent, monsieur le préfet, de se tenir en garde contre l'invasion possible de ce fléau, et de prendre dès maintenant toutes les mesures propres à arrêter son expansion dans notre pays s'il venait à franchir nos frontières, malgré le décret rendu par l'Empereur en date du Septembre et l'arrêté ministériel du 6 qui en fait suite.

J'ai l'honneur, en conséquence, de vous adresser une instruction relative à cette épizootie, afin de porter à la connaissance des vétérinaires, des autorités locales, des agriculteurs et des propriétaires ce qu'il est indispensable de savoir de sa nature et de son mode de propagation, et de vous rappeler les mesures de police sanitaire qui doivent immédiatement être mises en pratique dans toutes localités où son apparition serait signalée. L'histoire de cette épizootie, dont la France a déjà eu à souffrir dans le dernier siècle et dans le commencement du siècle actuel, montre qu'il est possible, sinon de s'en préserver toujours, du moins de réduire considérablement la proportion des pertes qu'elle peut causer, par l'application bien ordonnée des mesures de police sanitaire que prescrit notre législation sur la matière.

Je ne saurais donc, monsieur le préfet, vous recommander à cet égard une trop grande vigilance.

Le typhus contagieux des bêtes à cornes est une maladie étrangère à nos climats. Jamais il ne se développe spontanément dans les différentes contrés de l'Europe occidentale, quelles que soient, du reste, les mauvaises conditions hygiéniques auxquelles les troupeaux des grands ruminants puissent être exposés. C'est dans les plaines immenses de la Hongrie et de la Russie, qui sont connues sous le nom de *steppes*, que le typhus prend naissance; c'est là exclusivement qu'il trouve les conditions de son développement spontané; et telle est, à l'égard de cette question d'origine, la certitude acquise, depuis les savantes investigations des maîtres de la médecine vétérinaire en Russie, en Allemagne et en France, qu'on peut toujours affirmer, sans crainte d'erreur, quand on voit apparaître le typhus des bestiaux dans une région de l'Europe occidentale, qu'il y a été importé par une voie ou par une autre.

L'invasion actuelle de l'Angleterre ne fait pas exception à cette règle, quoi que l'on ait pu dire sur ce point de l'autre côté du détroit. Il est certain que c'est le typhus des steppes qui ravage ce pays, et qu'avant son apparition à Londres où il a fait sa première explosion, un convoi composé de trois cents animaux avait été embarqué à Revel, dans le golfe de Finlande, à destination pour l'Angleterre, et y était arrivé par Lubeck et Hambourg après une traversée de six jours environ, grâce à la rapidité des moyens de communication.

Le caractère exotique du typhus ne saurait donc aujourd'hui être contesté.

Mais si le typhus est exotique et ne prend naissance que dans la région des steppes, on le voit trop souvent déborder de son pays d'origine, à raison de ses propriétés éminemment contagieuses, et s'attaquer à la population bovine des contrées dans lesquelles ne se trouvent pas les conditions de son développement spontané. Ses routes les plus ordinaires ont été, dans le passé, celles qu'ont suivies les armées de l'Autriche et de la Russie, dont les troupeaux d'approvisionnements sont formés en grande partie d'animaux originaires des steppes. Plus rarement il s'est introduit par les voies commerciales de terre et de mer; mais c'est toujours par la contagion qu'il s'y est maintenu pendant un temps plus ou moins long, aux differentes époques où il y a fait son apparition.

La propagation du typhus d'une localité infestée dans une localité voisine ou même à grande distance, comme l'exemple de l'Angleterre en témoigne aujourd'hui, peut s'opérer par différents modes.

Le plus efficace de tous est le transport des animaux malades. Il suffit d'un seul sujet attaqué du typhus pour infecter tout un pays. Il n'est pas nécessaire d'un contact immédiat pour que sa transmission s'effectue; le typhus se transmet à distance par les émanations qui se dégagent des sujets malades; ces émanations ont assez de puissance pour agir en plein air.

Les germes morbides peuvent être portés à distance par les courants de l'atmosphère et infecter des troupeaux dans les pâturages, lorsque des animaux malades passent sur les routes qui les bordent.

Les animaux sains qui ont eu des rapports avec le animaux malades, et se sont imprégnés des principes de leur maladie, conservent encore les caractères extérieurs de la santé pendant un certain temps, dont la durée varie entre six et dix jours. C'est cette particularité, commune du reste à un grand nombre de maladies contagieuses, qui est une des conditions les plus puissantes de la propagation du typhus; car trop souvent les propriétaires des sujets contaminés, ne s'inspirant que de leur intérêt personnel, s'empressent de les faire conduire sur les foires et marchés pour réaliser immédiatement leur valeur et se mettre à couvert des pertes qu'ils pourraient subir. De là la dissémination possible et trop fréquente, du mal dans tous les sens par ses sujets qui, sous les apparences de la santé, recèlent en eux le germe d'une maladie encore cachée, mais dont l'avènement est fatal et à bref délai. L'histoire de l'épizootie actuelle de l'Angleterre démontre que c'est surtout par cette voie que le typhus a rayonné de la métropole dans un grand nombre des districts qui l'avoisinent, puis, de proche en proche, dans les districts plus éloignés, et enfin jusque dans l'Ecosse.

Ce ne sont pas seulement les animaux actuellement malades, ou qui doivent le devenir prochainement, qui sont les agents de la propagation du typhus; ceux qui sont en convalescence de cette maladie peuvent aussi la transmettre et avec tous les caractères de sa malignité, bien que chez eux elle paraisse éteinte. Le typhus peut être transmis par les fourrages imprégnés du souffle et de la bave des animaux malades, par les herbes, des pâturages où ils ont sejourné, par les liquides dont ils se sont abreuvés.

Les vêtements des hommes, la toison des moutons, les poils des chiens et des autres animaux peuvent se charger des principes de la maladie et la transporter à distance.

Enfin, elle peut se propager par les fumiers qui proviennent des étables infectées et dans la composition desquels les déjections morbides entrent en si grande quantité, par les débris des animaux morts, par leurs peaux fraîches et jusque par les cordages qui ont servi à les attacher et qui sont encore souillés de leur bave ou de leur sang.

Comme on le voit par cet aperçu sommaire, les voies sont nombreuses par lesquelles la contagion du typhus peut s'effectuer, et c'est leur multiplicité qui explique la facilité avec laquelle cette maladie se propage et les difficultés que l'on rencontre trop souvent à empêcher son expansion. Mais ces difficultés, si grandes qu'elles soient, ne sont pas supérieures aux efforts d'une administration vigilante et dévouée, et il est possible de les surmonter quand on s'attaque au fléau dès ses premières manifestations dans une localité.

Le typhus étant une maladie exotique que très-peu de personnes en France ont eu l'occasion d'observer, puisque sa dernière invasion remonte à 1814, il est nécessaire d'en retracer ici les caractères principaux.

Caractères du Typhus contagieux.

Dans la première période de cette maladie celle que l'on appelle la période d'incubation, parce que le mal n'est encore qu'en germe dans le corps et y couve pour ainsi dire, les animaux présentent tous les caractères extérieurs de la santé; ils mangent, boivent, et ruminent comme d'habitude, et les femelles donnent la même quantité de lait. Impossible donc de voir en eux des malades; et, de fait, s'ils sont condamnés à le devenir fatalement, ils ne le sont pas encore.

Cette période a une durée qui varie de six à dix jours.

Lorsque la maladie apparaît, elle se caractérise par l'abattement et une certaine expression du regard qui donne à l'animal un air sombre; sa tête est tendu, fixe, portée bas, avec les oreilles immobiles tombant en arrière; le dos est voussé et les membres postérieurs sont engagés sous le corps; le poil est terne, hérissé et sec au toucher; aux plis des jointures, notamment dans la région des aisselles et des aînes, la peau se trouve mouillée de sueurs qui déterminent le soulèvement de son épiderme et sa dénudation.

La rumination n'est pas toujours suspendue dans les premiers jours de la maladie, mais elle ne s'effectue plus avec sa régularité habituelle; l'animal grince des dents et bâille fréquemment.

Puis apparaissent des tremblements généraux, manifestés surtout en arrière des épaules, aux grassets et aux fesses avec des alternatives de chaleur et de froid, notamment vers la base des cornes, aux oreilles et aux extrémités des membres.

Les yeux sont rouges et pleurent, et les larmes qui s'en écoulent en abondance ont une telle âcreté qu'elles creusent sur le chanfrein une sorte de sillon; l'epidermie se détache sur les régions de la peau où elles se sont répandues.

Un jetage a lieu par les ouvertures des narines, d'un liquide d'abord aqueux et âcre comme les larmes et produisant, comme elles, l'érosion épidermique des parties de la peau avec lesquelles il reste en contact.

Avec les progrès de la maladie, les humeurs des yeux ou du nez deviennent purulentes, et souvent alors l'air que les animaux expirent est fétide. A ce moment la respiration se précipite, elle devient difficile et s'accompagne d'un bruit de cornage que l'on entend à distance, en entrant dans les étables.

De la bouche s'échappe une salive écumeuse, qui forme des flocons blanchâtres autour des lèvres. Sur le bourrelet

de la mâchoire supérieure, sur les gencives et sur les mamelons de la face interne des joues, l'épiderme soulevé par de la sérosité, n'adhère plus aux parties et, se détachant facilement sous la pression des doigts, laisse à nu des plaies vives d'un rouge foncé.

A une période plus avancée de la maladie, la tête est agitée, d'un côté à l'autre, d'une sorte de branlement qui a une certaine analogie avec celui des vieillards, et, en même temps, les mouvements rapides de la respiration lui impriment, à chaque fois que les flancs s'abaissent, une secousse de bas en haut.

La diarrhée ne tarde pas à se manifester; ce sont d'abord des matières excrémentielles qui sont expulsées liquides, avec une grande impétuosité, et associées à des gaz qui leur donnent une fétidité caractéristique; puis, quand le canal est vide, les produits des déjections deviennent séreux; enfin, à la dernière période, les matières rejetées prennent une teinte brune qu'elles doivent au sang qui leur est associé, et répandent une odeur d'une extrême fétidité.

A mesure que la maladie progresse, l'affaiblissement des forces s'accuse davantage; les malades tombent dans un état d'extrême prostration; c'est à peine s'ils peuvent se tenir debout et s'ils ont la force de conserver l'équilibre, quand on les oblige, par l'excitation des aiguillons ou des chiens, à se mettre en mouvement. La plupart du temps, ils restent couchés, la tête tendue et appuyée sur le menton. La stupeur est extrême; les yeux s'enfoncent profondément dans les orbites; une humeur purulente remplit le vide qui s'est formé entre le globe et les paupières; la matière du jetage, épaisse, mêlée de stries sanguinolentes, souvent fétide, obstrue tellement les narines que les animaux sont obligés de respirer par la bouche; la température du corps est sensiblement abaissée, et quand on appose les mains sur la peau du dos et des lombes, on perçoit une sensation analogue à celle que donne le toucher d'un animal à sang froid. Souvent, à cette période, se manifeste un symptôme très-caractéristique, c'est un gonflement de chaque côté de l'épine du dos, déterminé par le développement spontané de gaz sous la peau. Quand on palpe cette région, on perçoit une sensation de crépitation, et si on la percute, elle rend un son analogue à celui qui se fait entendre lorsque, dans les boucheries, on frappe sur la peau d'un bœuf soufflé.

Quand ce symptôme est apparu, les animaux sont froids et insensibles; les mouches les couvrent comme si déjà ils étaient des cadavres. Elles s'accumulent autour des ouvertures naturelles et y déposent leurs œufs, qui quelquefois ont le temps d'y éclore: d'où l'apparition d'un fait qui a été considéré autrefois comme une expression spéciale de la maladie, mais qui n'est évidemment qu'un accident secondaire, résultant de l'état d'insensibilité à peu près complète dans lequel les animaux sont tombés.

La sécrétion du lait se tarit presque entièrement dès les premiers signes de la maladie; les mamelles se flétrissent et deviennent flasques et froides; quand elles donnent encore un peu de lait, ce liquide est séreux et d'une teinte jaune très-accusée.

Chez les femelles, il existe un symptôme très-propre à faciliter le diagnostic de la maladie, lorsqu'on doit passer en revue un certain nombre de bêtes et formuler un jugement rapide, c'est la coloration particulière de la membrane du vagin, qui a une teinte rouge d'acajou avec des marbrures d'une nuance plus foncée.

L'amaigrissement rapide et profond des malades est un des caractères particuliers à cette affection, et qui s'accuse à un degré d'autant plus marqué que la vie se prolonge davantage; les sujets deviennent étiques; leurs muscles, effacés et parcheminés, laissent apparaître tous les reliefs du squelette, notamment à la région du bassin, dont les excavations se creusent profondément.

La mort survient d'ordinaire du troisième au douzième jour, rarement la vie se prolonge au delà de cette dernière période.

En résumé, si on laisse de côté les détails accessoires, un animal frappé du typhus se reconnaît facilement à l'ensemble des symptômes suivants: attitude immobile, dos voûté, membres convergents sous le corps, tête portée en avant, fixe, oreilles tombantes en arrière, regard sombre, yeux pleureurs, jetage nasal, bouche écumeuse, tête branlante, grincement des dents, respiration précipitée, bruit de cornage, tremblements généraux, diarrhées très-abondantes et fétides, gonflement de la région dorsale par des gaz accumulés sous la peau, abaissement de la température du corps, faiblesse extrême, prostration, stupeur, coloration rouge foncé avec marbrures de la membrone du vagin, tarissement du lait.

Altérations propres au Typhus.

Dans le troisième estomac ou feuillet, injection des lames multiples de cet appareil, taches ecchymotiques diffuses sur un grand nombre, perforations ulcéreuses de quelques-unes, dessiccation, sous forme de galettes, des matières alimentaires interposées entre elles.

Dans la caillette, quatrième estomac, injection très-vive de toutes ses duplicateurs qui ont une couleur rouge d'acajou, et, dans quelques cas, ulcérations multiples disséminées à leur surface; ces ulcérations reflètent une teinte blanche lavée.

Dans l'intestin grêle, plaques gaufrées formées par la confluence de pustules pleines ou ulcérées sur les glandes de Peyer.

Cette lésion n'est pas constante dans l'intestin grêle mais ce que l'on observe toujours sur la muqueuse de cet intestin, c'est l'injection générale avec des vergetures longitudinales, coupées irrégulièrement par des vergetures transverses, qui dessinent sur la membrane un réseau irrégulier à grandes mailles extrêmement caractérisé.

Dans le colon, petites ulcérations extrêmement nombreuses, dans le profondeur desquelles est attaché un petit caillot de sang formant relief dans l'intestin; en enlevant ce caillot par le grattage, on met à nu l'ulcération assez profonde qui lui servait comme de point d'insertion. Injection générale de toute la muqueuse du colon et de celle du rectum, vergetée et aréolée comme la muqueuse de l'intestin grêle.

La rate est généralement saine.

Taches pétéchiales et ecchymoses profondes dans le cœur.

Emphysème général du poumon, dont les lobules sont isolés entre les lames épaisses du tissu cellulaire, qui sont soufflées par les gaz exhalés dans leurs aréoles comme dans celles du tissu cellulaire sous-cutané.

Injection de la muqueuse des bronches et du larynx, et exsudation à sa surface de mucosités purulentes condensées en fausses membranes dans le larynx.

Aucune ulcération sur cette membrane.

Le typhus contagieux des bêtes a cornes est une maladie qui demeure supérieure dans le plus grand nombre des cas, l'expérience l'a trop souvent démontré, à toutes les ressources de l'art. Ce n'est donc pas sur des moyens de traitement qu'il faut compter pour sauvegarder la fortune des particuliers et, avec elle, la fortune publique, lorsque cette épizootie s'attaque à la population bovine d'un pays, mais bien sur les précautions les plus minutieuses prises en vue d'empêcher sa propagation par les différentes voies de la contagion.

Les indications donnés dans cette instruction doivent vous inspirer à cet égard, monsieur le préfet, votre ligne de conduite.

Tous vos efforts doivent tendre, lorsque l'épizootie s'est déclarée dans une localité, à empêcher que les animaux malades puissent avoir des communications, de quelque nature qu'elles soient, avec des animaux sains. Vous ne devrez même pas reculer, au début de la maladie dans une contrée, devant l'abatage immédiat des animaux les premiers malades et des animaux qui ont cohabité avec eux, si vos informations vous renseignent très-exactement sur la manière dont la maladie s'est transmise, et si elles vous donnent la conviction qu'en l'étouffant dans son foyer primitif, vous pourrez arrêter son expansion et prevenir sa propagation.

La loi vous arme de toute l'autorité nécessaire pour appliquer cette mesure commandée par l'intérêt public, et dont l'application entraîne, du reste, l'indemnisation légitime des propriétaires.

La contagion pouvant s'effectuer à distance par les émanations qui se dégagent du corps des animaux malades, il est nécessaire qu'ils soient sequestrés de la manière la plus rigoureuse dans des locaux aussi isolés que possible de ceux qu'habitent les animaux sains; que les pâturages communs, les abreuvoirs et les routes leur soient défendus; que les personnes préposées à leur donner des soins n'aient aucun contact avec les animaux non encore infectés; que des relations ne puissent pas s'établir par l'intermédiaire d'animaux d'autres espèces, notamment des moutons, dont la toison touffue peut s'imprégner des principes contagieux et servir à les transporter à de très-grandes distances.

Dans des occurrences comme celles qui se présentent, l'agglomération des animaux de l'espèce bovine sur les champs de foire ou sur les marchés peut entraîner les conséquences les plus fâcheuses; car il suffit d'un seul animal infecté pour qu'un grand nombre de ceux qui auront été en rapport avec lui contractent la maladie et la disséminent dans une foule de directions. Il est possible aussi que des animaux, qui ne sont encore qu'à la période d'incubation de la maladie, soient conduits sur les champs de foire par des propriétaires plus soucieux de leurs intérêts particuliers que de l'intérêt public. Vous aurez à voir si la gravité des circonstances ne vous impose pas l'obligation de suspendre les foires et marchés publics dans les localités où l'épizootie sévira; et, dans le cas où cette mesure, toujours grave, ne vous paraîtrait pas indispensable, vous devriez prescrire les plus grandes précautions pour prévenir l'introduction sur

les marchés d'animaux suspects, à quelque titre que ce soit. Ces précautions devront consister dans des certificats de santé délivrés aux conducteurs des bestiaux par les maires des communes d'où ils proviennent et les vétérinaires inspecteurs de ces communes.

Mais l'action de l'administration, si énergique qu'elle soit, resterait insuffisante si vos administrés ne se pénétraient pas tous de la nécessité de concourir de tous leurs efforts à l'œuvre de la préservation commune, et s'ils n'étaient pas convaincus qu'il suffit souvent d'une imprudence commise ou d'une contravention aux règlements sanitaires pour que la maladie trouve une issue qui lui permettrait d'étendre ses ravages. Vous devrez donc faire en sorte d'éclairer les populations par tous les moyens de publicité dont vous disposez sur les dangers qui les menacent, et sur l'utilité des mesures que vous serez obligé de prendre pour les en préserver.

Voici, du reste, celles de ces mesures qu'il est urgent d'appliquer immédiatement :

Tout propriétaire, détenteur ou gardien de bêtes à cornes, à quelque titre que ce soit, doit être tenu de faire la déclaration immédiate au maire de la commune des bêtes malades ou suspectes qu'il peut avoir chez lui ou dans ses pâturages.

Dès que le maire sera prévenu, il fera faire la visite des animaux dont la maladie lui aura été déclarée, soit par le vétérinaire le plus prochain, soit par celui auquel cette fonction aura été assignée.

Je vous recommande, monsieur le préfet, d'insister auprès des maires des différentes communes de votre département, pour que cette prescription d'utilité absolue soit rigoureusement observée : elle est du reste imposée par les règlements sur la matière, et ceux qui y contreviendraient seraient passibles de peines sévères (1).

Lorsque, d'après le rapport du vétérinaire, il sera constaté qu'une ou plusieurs bêtes sont malades, le maire veillera scrupuleusement à ce que ces animaux soient séparés des autres et ne communiquent d'aucune manière, directement ou indirectement, avec aucun animal de la commune. Les propriétaires, sous quelque prétexte que ce soit, ne pourront les faire conduire dans les pâturages ni aux abreuvoirs communs, et ils seront tenus de les nourrir dans des lieux renfermés.

Cette séquestration des malades ne saurait être pratiquée avec trop de rigueur : c'est d'elle que dépend le salut des autres bestiaux de la localité, et les maires, en tenant la main à l'observation rigoureuse de la règle, peuvent rendre à leurs concitoyens les plus grands services. Il faut donc qu'ils soient assez convaincus de la gravité de leurs devoirs pour ne pas se contenter de demi-mesures.

Chaque jour le maire de la commune où la maladie s'est déclarée doit vous adresser un rapport détaillé dans lequel il vous indiquera les noms des propriétaires dont les bestiaux sont atteints et le nombre des bêtes malades (2). Aussitôt que le maire aura acquis la preuve que l'épizootie s'est déclarée dans sa commune, il devra en instruire tous les propriétaires de bestiaux de ladite commune par une affiche posée aux lieux où se placent les actes de l'autorité publique, laquelle affiche enjoindra à ces propriétaires de déclarer à l'autorité communale le nombre de bêtes à cornes qu'ils possèdent, avec désignation d'âge de taille, de poil, etc.

Une copie de ces déclarations devra vous être envoyée, et vous aurez soin de la faire parvenir à mon administration (3).

Ce dénombrement est nécessaire pour que l'autorité supérieure puisse se rendre compte des pertes et apprécier les indemnités qui pourraient être allouées à ceux qui les auront subies.

Dès que l'épizootie s'est déclarée dans une commune, aucun des animaux, même ceux qui sont encore sains dans cette commune, ne peut en être distrait pour être conduit sur les foires et marchés et même chez des particuliers des communes voisines, car leur migration peut transporter la contagion à distance. Toute communication des bestiaux des localités infestées avez ceux des localitées qui ne le sont pas doit être absolument empêchée. Il doit être fait, en conséquence, des visites de temps à autre chez les propriétaires de bestiaux dans les communes infestées, pour s'assurer qu'aucun animal n'en a été éloigné (4).

Si, au mépris de ces dispositions, une bête malade ou suspecte, dans un pays infesté, était conduite sur un marché ou une foire, ou même chez un particulier d'une localité non infestée, l'auteur de cette contravention serait passible des peines portées par les articles du code pénal qui ont réglé cette matière.

Les propriétaires qui feraient conduire leurs animaux malades ou suspects par leurs domestiques ou autres personnes, dans les marchés ou les foires ou chez des particuliers de pays non infestés, seraient responsables des faits de ces conducteurs (5).

Les propriétaires de bêtes saines peuvent néanmoins, dans les pays infestés, en faire tuer chez eux ou en vendre aux bouchers de leurs communes, mais aux conditions suivantes :—

1° Il faut que le vétérinaire préposé par l'autorité ait constaté que ces bêtes peuvent être livrées sans danger à la consommation :

2° Le boucher doit tuer les bêtes dans les vingt-quatre heures :

3° Le propriétaire ne peut s'en dessaisir et le boucher les tuer, avant qu'ils n'en aient reçu, par écrit, la permission du maire, qui en fera mention sur son état :

4° Le boucher ne peut, sous aucun prétexte, vendre pour son compte et sur pied la bête qu'il aura achetée pour être immédiatement abattue.

Toute contravention à cet égard sera punie conformément aux lois et règlements sur la matière. Le propriétaire et le boucher sont solidaires (6).

L'expérience ayant appris que les chiens peuvent devenir des agents de la transmission de la contagion, ces animaux doivent être tenus à l'attache dans les localités infestés ; et il est ordonné de tuer tous ceux que l'on trouverait divaguants. (Loi du 19 Juillet 1791.—Arrêté du Directoire exécutif du 27 Messidor an 5.)

Si, à la première apparition de l'épizootie dans une commune, l'autorité municipale jugeait nécessaire, pour étouffer la maladie avant qu'elle ait pris de l'extension, de faire abattre immédiatement les bestiaux malades et ceux qui auraient cohabité avec eux, elle pourrait prescrire cette mesure, en ayant soin de faire constater par des procès-verbaux le nombre et la valeur des animaux qui devraient être abattus.

Il va de soi que toutes les bêtes saines, sacrifiées pour prévenir la contagion dont elles peuvent receler les germes, pourront être livrées à la consommation comme bêtes de boucherie.

Les extraits des procès-verbaux d'abatage de ces animaux devront m'être addrésses, pour que mon administration puisse faire payer aux propriétaires l'indemnité à laquelle ils ont droit d'après la loi (7).

Les bêtes mortes des suites de l'épizootie, ou dont l'abatage aura été ordonné en raison de la gravité de leur maladie, devront être enfouies à une distance aussi grande que possible des habitations, dans des fosses de 2 mètres au moins de profondeur dans les terrains peu perméables et plus profondément encore dans les terrains dont la perméabilité est très-grande. Cette fosse sera recouverte de toute la terre qu'on en aura extraite.

S'il était possible de jeter au préalable sur les cadavres une couche de chaux vive, cete précaution serait excellente.

Les cuirs devront être tailladés avant que le corps soit placé dans la fosse, afin d'annuler leur valeur commerciale, pour que personne ne soit tenté de les déterrer. Les cadavres ne seront pas traînés vers le lieu de leur enfouissement, afin d'éviter qu'ils ne laissent sur le sol des matières recélant en elles le principe de la contagion. Ils devront être charriés sur des voitures traînées par des chevaux, des ânes ou des mulets, et ces voitures seront immédiatement lavées à grande eau, après avoir servi à cet usage.

Dans les localités où il existe des clos d'équarrissage ou des usines dans lesquelles les matières animales sont converties en produits industriels, les propriétaires seront libres, au lieu de faire enfouir les corps des bêtes mortes, de les faire exploiter par les établissements appropriés à cette destination, à la condition que la distance de leur propriété à ces établissements sera telle, que les corps des animaux morts ne devront pas traverser des localités non infestées.

Les fumiers provenant des étables infestées devront être enfouis.

Il ne faut pas oublier que les fourrages sur lesquels les bêtes malades ont soufflé et répandu leur bave, que les litières qu'elles ont souillées de leurs déjections, peuvent

(1) Arrêt du Parlement, 24 Mars 1745.—Arrêt du Conseil, 19 Juillet 1746.—Arrêt du Conseil, 16 Juillet 1784.—Décret de l'Assemblée constituante, 6 Octobre 1791.—Arrêté du Directoire exécutif, 27 Messidor an X.—Ordonnance du Roi du 15 Janvier 1815.—Code pénal, article 459.

(2) Arrêt du Conseil, 1746.—Décret de l'Assemblée constituante, 1791.—Code pénal, article 460.

(3) Arrêt du Conseil du 19 Juillet 1746.—Arrêté du Directoire exécutif du 27 Messidor an 5.

(4) Arrêt du Conseil du 24 Mars 1745.—Arrêté du Directoire exécutif du 27 Messidor an 5.

(5) Arrêt du Conseil du 7 Juillet 1746.—Code pénal, article 460.

(6) Arrêt du Conseil du 19 Juillet 1746.—Arrêté du Directoire exécutif du 27 Messidor an 5.

(7)

être des agents de la transmission de la contagion; les uns et les autres devront être traités comme les fumiers, après la mort de la bête à l'usage de laquelle ils ont servi; en pareil cas, une économie mal entendue peut être cause de nouvelles pertes.

Les étables qui ont été habitées par des bêtes malades doivent être assainies avec le plus grand soin, d'après les prescriptions des hommes de l'art. Le lavage à fond avec des liquides dont les propriétés désinfectantes sont reconnues, tels que le chlorure de chaux, l'eau de chaux chlorurée, les solutions d'acide phénique, les eaux de lessive, le grattage des râteliers et des mangeoires, leur revêtement avec une couche de goudron, le repiquage du sol et l'association à la terre qui le forme, de sable, de terre ou de plâtre coaltarés, enfin les fumigations chlorurées, voilà une série de moyens dont l'expérience a consacré l'efficacité, et qui doivent être scrupuleusement recommandés aux propriétaires des étables infestées: qu'ils demeurent bien convaincus que la dépense qu'ils s'imposeront pour assainir leurs étables sera largement compensée par le bénéfice qu'ils en retireront.

Même après ces précautions prises, il sera prudent de n'introduire des bêtes saines dans les étables infestées qu'après deux semaines au moins, pendant lesquelles on les aura laissées ouvertes à tous les vents.

Les objets qui auront servi à l'usage des bêtes malades devront être détruits par le feu, s'ils sont de minime valeur, comme les cordages d'attache, par example, ou purifiés par les procédés d'assainissement qui leur conviennent.

Telles sont, monsieur le préfet, les mesures diverses qu'il me paraît urgent de prendre pour empêcher l'extension de l'épizootie dans votre département, si elle venait à y pénétrer. Je ne saurais trop vous recommander de veiller à ce qu'elles soient partout scrupuleusement et rigoureusement appliquées. Si les efforts sont bien concertés, si chacun est à son poste et fait bien son devoir, on peut opposer à l'invasion du mal une digue qu'il ne franchira pas.

Du reste, monsieur le préfet, vous devez trouver de bons auxiliaires, pour l'application de tous les moyens propres à combattre l'épizootie, dans les sociétés vétérinaires, les chambres consultutives d'agriculture, les associations agricoles et les vétérinaires de votre département. Le décret du 18 Octobre 1848 a institué près de vous un conseil d'hygiène publique et de salubrité, dont une des attributions est relative aux épizooties et aux maladies des bestiaux. Mais il me paraîtrait très-utile que, pour répondre aux nécessités du moment, des commissions spéciales, composées plus particulièrement de vétérinaires et d'agriculteurs, fussent instituée partout où le besoin s'en ferait sentir et eussent pour mission d'approprier plus efficacement aux conditions locales les mesures de police sanitaire que comport l'epizootie.

Je désire, monsieur le préfet, que vous me teniez au courant, par des communications très-fréquentes, de tous les faits relatifs à l'épizootie qui pourraient se produire dans votre département.

Si les circonstances l'exigent, je vous transmettrai des instructions complémentaires de celles qui font l'objet de la présente circulaire.

Recevez, monsieur le préfet, les assurances de ma considération très-distinguée.

Le ministre de l'agriculture,
du commerce et des travaux publics,
ARMAND BÉHIC.

CODE PENAL.

ARTICLES 459, 460, 461, 462.

459. Tout détenteur ou gardien d'animaux ou de bestiaux soupçonnés d'être infectés de maladie contagieuse, qui n'aura pas averti sur-le-champ le maire de la commune où ils se trouvent, et qui même, avant que le maire ait répondu à l'avertissement, ne les aura pas tenus renfermés, sera puni d'un emprisonnement de six jours à deux mois, et d'une amende de seize francs à deux cents francs.

460. Seront également punis d'un emprisonnement de deux mois à six mois, et d'une amende de cent francs à cinq cents francs, ceux qui, au mépris des défenses de l'administration, auront laissé leurs animaux ou bestiaux infectés communiquer avec d'autres.

461. Si de la communication mentionnée au précédent article, il est résulté une contagion parmi les autres animaux, ce qui auront contrevenu aux défenses de l'autorité administrative seront punis d'un emprisonnement de deux ans à cinq ans, et d'une amende de cent francs à mille francs; le tout sans préjudice de l'exécution des lois et réglements relatifs aux maladies épizootiques, et de l'application des peines y portées.

462. Si les délits de police correctionnelle dont il est parlé au présent chapitre ont été commis par des gardes champêtres ou forestiers, ou des officiers de police, à quelque titre que ce soit, la peine d'emprisonnement sera d'un mois au moins, et d'un tiers au plus en sus de la peine la plus forte qui serait appliquée à un autre coupable du même délit.

ORDINANCE of the PREFECT of POLICE.

Paris, 27 Septembre.

Nous, préfet de police,

Considérant qu'une épizootie exerce actuellement ses ravages en Angleterre sur les animaux de l'espèce bovine, et que, de ce pays où elle était restée confinée d'abord, elle s'est propagée en Hollande et en Belgique;

Considérant qu'il est urgent de se tenir en garde contre l'invasion possible de ce fléau en prescrivant dès maintenant les mesures propres à arrêter son expansion, s'il venait à pénétrer en France:

Ordonnons ce qui suit:—

Article 1er. Tout propriétaire, détenteur ou gardien de bêtes à cornes atteintes ou présentant des symptômes du typhus contagieux, est tenu d'en faire la déclaration, savoir: dans les communes rurales de la préfecture de police, devant le maire, et à Paris devant le commissaire de police. (Art. 459 du Code pénal.)

Art. 2. Immédiatement après la dite déclaration, le maire ou le commissaire de police fera visiter par un vétérinaire les animaux suspects ou atteints de maladie.

Art. 3. Lorsque, d'aprés le rapport du vétérinaire désigné par l'autorité, il sera constaté qu'une ou plusieur bêtes sont malades, ces animaux seront séquestrés. (Arrêts du Conseil du 19 Juillet 1746, art. 2, et du 16 Juillet 1784, art. 4.)

Défense est faite aux propriétaires desdits animaux de les faire conduire, sous quelque prétexte que ce soit, dans les pâturages et aux abreuvoirs communs. (Arrêts ci-dessus rappelés.)

Art. 4. Dans les localités où il sera constaté que la maladie a fait invasion, les maires ou les commissaires de police mettront en demeure les propriétaires de bestiaux de déclarer à l'autorité le nombre de bêtes à cornes qu'ils possèdent, avec désignation d'âge, de taille, de poil, etc. (Arrêt du Conseil du 19 juillet 1746.)

Une copie de ces déclarations sera transmise à l'administration, ce dénombrement étant nécessaire pour que l'autorité supérieure puisse se rendre compte des pertes et apprécier les indemnités qui pourraient être allouées à ceux qui auraient subi ces pertes.

Art. 5. Chaque jour, le maire, dans les communes rurales où la maladie se sera déclarée, et, à Paris, le commissaire de police du quartier adresseront à la Préfecture de police un rapport detaillé dans lequel seront indiqués les noms des propriétaires dont les bestiaux auront été atteints et le nombre des bêtes malades. (Arrêt du conseil du 19 Juillet 1746.)

Art. 6. Toute communication des bestiaux des localités non atteintes est absolument interdite. Par conséquent, aucun des animaux, même de ceux qui sont encore sains, ne peut être conduit sur les foires et marchés et même chez des particuliers. (Arrêts du conseil des 19 Juillet 1746 et 16 juillet 1784.)

Art. 7. Il sera fait, par les soins de l'autorité locale, de fréquentes visites chez les propriétaires de bestiaux des localités infectées, pour s'assurer qu'aucun animal n'en a été éloigné.

Il est fait défense à toutes personnes de refuser l'entrée de leurs étables et écuries, et d'apporter aucun obstacle à ce qu'il soit procédé auxdites visites, dont il sera dressé procès-verbal. En cas de difficultés, les parties intéressées pourront faire tels dires et réquisitions qu'elles aviseront, et il y sera statué provisoirement et sans délai par l'officier municipal qui aura prescrit la visite. (Arrêt du Parlement du 24 Mars 1745, etc.)

Art. 8. Les propriétaires qui feraient conduire par leurs domestiques ou autres personnes sur les marchés, sur les foires ou chez des particuliers de localités non infectées, des animaux malades ou suspects, seront responsables des faits de ces conducteurs. (Arrêt du Conseil du 7 Juillet 1746 et art. 460 due Code penal.)

Art. 9. Les propriétaires de bêtes saines pourront, dans les localités atteintes par la maladie, les vendre pour être abattues dans les établissements autorisés *ad hoc*, mais aux conditions suivantes:—

1° Un vétérinaire, désigné par l'autorité, dressera un procès-verbal constatant que ces bêtes peuvent être livrées, sans danger, à la consommation:

2° A Paris, ce procès-verbal sera visé par le commissaire de police, qui le transmettra à l'inspecteur de l'abattoir où la bête sera conduite:

3° Dans les communes, le procès-verbal sera adressé au maire, qui permettra l'abattage des animaux dans une tuerie autorisée :

4° L'abattage aura lieu dans les vingt-quatre heures :

5° Le boucher ne pourra, sous aucun prétexte, revendre sur pied la bête achetée pour être immédiatement abattue. (Arrêt du Conseil du 19 Juillet 1746.)

Art. 10. A la première apparition de l'epizootie dans une localité, mais après examen et procès-verbal dressé par les hommes de l'art, l'autorité pourra, si elle le juge convenable, afin d'étouffer la maladie avant qu'elle ait pris de l'extension, faire abattre immédiatement les bestiaux malades et ceux qui auraient cohabité avec eux, en ayant soin de constater par des procès-verbaux le nombre et la valeur des animaux qui devraient être abattus.

Les bêtes reconnues saines, qui auraient été abattues, pourront être livrées à la consommation.

Les extraits des procès-verbaux d'abattage de ces animaux seront adressés à la Préfecture de police, pour être transmis à S. Exc. le Ministre de l'agriculture, du commerce et des travaux publics.

Art. 11. Dans les communes rurales du ressort de la préfecture de police, les bêtes mortes des suites de l'épizootie ou dont l'abattage aura été ordonné en raison de la gravité de leur maladie devront être enfouies loin des habitations, dans des fosses de deux mètres au moins de profondeur et recouvertes de toute la terre extraite de ces fosses, à moins que les cadavres de ces animaux ne soient transportés dans des usines où les matières animales soient converties en produits industriels.

Les cuirs devront être tailladés avant que le corps ne soit placé dans la fosse, pour que personne ne soit tenté de les déterrer.

Il devra en être de même si les cadavres sont conduits dans une usine.

Art. 12. A Paris, let bêtes mortes de l'épizootie, ou dont l'abattage aura été ordonné comme atteintes de la maladie, seront transportées au clos d'équarrissage municipal d'Aubervilliers on dans des établissements autorisés à convertir en engrais les matières animales.

Art. 13. Le transport des animaux morts de l'épizootie ou abattus comme malades, ne pourra s'effectuer, de la localité à la fosse ou dans l'une des usines ci-dessus designées, que dans des voitures hermétiquement closes et construites conformément aux prescriptions des règlements concernant le transport des matières insalubres.

Ces voitures seront tenues en constant état de propreté, au moyen de lavages pratiqués avec des liquides désinfectants.

Art. 14. Les fumiers provenant des étables infecteés devront être enfouis.

Il en sera de même des fourrages et litières ayant servi à l'usage de bêtes mortes de maladie.

Art. 15. Les chiens pouvant devenir des agents de transmission de la contagion, ces animaux seront tenus à l'attache dans les localités infectées, et il est ordonné de tuer tous ceux qu'on trouvera circulant sur la voie publique. (Loi du 19 Juillet 1791.)

Art. 16. Les étables et autres locaux dans lesquels auront séjourné les animaux atteints de la maladie seront assainis, à la diligence des maires ou des commissaires de police.

Ces locaux ne pourront être occupés qu'après qu'il aura été constaté, en présence d'un expert vétérinaire, que les causes d'infection n'existent plus.

Art. 17. Les contraventions aux dispositions de la présente ordonnance seront constatées par des procès-verbaux qui nous seront adressés pour être transmis aux tribunaux compétents.

Art. 18. La présente ordonnance sera imprimée et affichée.

Les sous-préfets des arrondissements de Sceaux et Saint-Denis, les maires et les commissaires de police des communes rurales du ressort de la Préfecture de police, les commissaires de police de Paris, le chef de la police municipale, l'inspecteur général des halles et marchés, l'inspecteur contrôleur de la fourrière et les autres préposés de la Préfecture de police sont chargés, chacun en ce qui le concerne, de tenir la main à son exécution.

Le préfet de police,
BOITELLE.

BELGIUM.

INSTRUCTIONS issued by the MINISTER of the INTERIOR, entitled NOTICE SUR LA PESTE BOVINE.

(*Transmitted by Lord Howard de Walden.*)

La peste bovine, ou typhus contagieux, est la maladie la plus meurtrière qui atteigne les bêtes à cornes. L'expérience a prouvé que de cent animaux chez lesquels elle se développe, il n'y en a pas dix qui échappent à la mort. Etrangère à nos climats, elle ne naît jamais spontanément chez nos bestiaux. Ceux-ci la reçoivent toujours par contagion des bêtes bovines qui vivent en grands troupeaux dans les steppes de la Russie et de la Hongrie, où elle est enzootique.

Il suffit d'un seul animal attaqué par le typhus pour infecter tout un pays. La maladie se transmet nonseulement par contact immédiat, mais encore par contact indirect; les émanations qui se dégagent des bestiaux atteints la communiquent à d'assez grandes distances, même en plein air; elle se propage aussi par l'intermédiaire d'animaux qui, ne l'ayant encore eux-mêmes qu'en germe, peuvent conserver toutes les apparences de la santé pendant cinq à dix jours et même davantage. Les bêtes en convalescence la communiquent, de même que les fourrages imprégnés du souffle et de la bave des animaux malades, les herbes des pâturages où ils ont séjourné et les liquides dont ils se sont abreuvés.

Les vêtements des hommes, la toison des moutons,* les poils des chiens et des autres animaux peuvent se charger des principes de la maladie et la transporter à distance.

Enfin, elle peut se propager par les fumiers qui proviennent des étables infectées et dans la composition desquels les déjections morbides entrent en si grande quantité, par les débris des animaux morts, par leurs peaux fraîches, et jusque par les cordages qui ont servi à les attacher et qui sont encore souillés de leur bave ou de leur sang.

Symptomes.

Lorsque le typhus a frappé une bête bovine, on le reconnaît assez facilement à l'ensemble des symptômes suivants: attitude immobile, dos voûté, membres convergents sous le corps, tête portée en avant, fixe, oreilles tombantes en arrière, regard sombre, yeux pleureurs, jetage nasal, bouche écumeuse, tête branlante, grincement des dents, respiration précipitée, bruit de cornage, tremblements généraux, diarrhées très-abondantes et fétides, gonflement de la région dorsale par des gaz accumulés sous la peau, abaissement de la température du corps, faiblesse extrême, prostration, stupeur, coloration rouge foncé (couleur acajou) avec marbrures de la membrane du vagin, tarissement du lait.

Il y a d'ailleurs un moyen sur de confirmer un diagnostic douteux, c'est de remonter à la source de la maladie. Comme celle-ci ne naît jamais spontanément chez nos bestiaux et qu'elle se transmet toujours par contagion, il suffit de constater si du bétail, récemment importé de la Hollande, source exclusive du typhus en Belgique, a été en contact direct ou indirect avec des animaux infectés. Dans l'affirmative, il y a à peu près certitude que c'est à la peste bovine qu'on a affaire; dans le cas contraire, on peut croire qu'on s'est trompé sur la nature des symptômes observés. Du reste, lorsqu'il y a doute, l'autopsie fournira des indices certains pour le lever. C'est pourquoi on énumère ci-après en détail les altérations constatées chez les animaux morts par suite de la peste bovine.

Altérations propres au typhus.

Dans le troisième estomac ou feuillet, injection des lames multiples de cet appareil, taches ecchymotiques diffusés sur un grand nombre, perforations ulcéreuses de quelques-unes, dessication sous forme de galettes, des matières alimentaires interposées entre elles.

Dans la caillettée, quatrième estomac, injection très-vive de toutes ses duplicatures, qui ont une couleur rouge d'acajou, et, dans quelques cas, ulcérations multiples disséminées à leur surface; ces ulcérations reflètent une teinte blanche lavée.

Dans l'intestin grêle, plaques gaufrées formées par la confluence de pustules pleines ou ulcérées sur les glandes de Peyer.

Cette lésion n'est pas constante dans l'intestin grêle; mais ce que l'on observe toujours sur la muqueuse de cet intestin, c'est l'injection générale avec des vergetures longitudinales, coupées irrégulièrement par des vergetures transverses, qui dessinent sur la membrane un réseau irrégulier à grandes mailles extrêmement caracterisé.

Dans le colon, petites ulcérations extrêmement nombreuses et assez profondes. Injection générale de toute la muqueuse du colon et de celle du rectum, vergetée et aérolée comme la muqueuse de l'intestin grêle.

La rate est généralement saine.

Taches pétéchiales et ecchymoses profondes dans le cœur.

Emphysème général du poumon, dont les lobules sont isolées entre les lames épaisses du tissu cellulaire, qui sont

* Des vétérinaires instruits prétendent même que le typhus peut se transmettre des bêtes bovines aux moutons et aux chèvres. Quoi qu'il en soit de cette opinion, il faut éviter la cohabitation de ces derniers animaux avec des bêtes à cornes infectées.

souffiés par les gaz exhalés dans leurs aréoles comme dans celles du tissu cellulaire sous-cutané.

Injection de la muqueuse des bronches et du larynx, et et exsudation à sa surface de mucosités purulentes condensées en fausses membranes dans le larynx.

Traitement.

Le typhus n'est pas accessible aux ressources de l'art. Si quelques guérisons se produisent de loin en loin, elles sont si rares que, sans une grands imprudence, on ne saurait chercher de ce côté les moyens de conserver le bétail d'un pays infesté. Les mesures où il faut avant tout chercher le salut, ce sont celles qui peuvent avoir pour effet d'empêcher la propagation de la maladie par les différentes voies de la contagion.

Voici ces mesures, indiquées par paragraphes numérotés pour qu'on puisse plus facilement s'y retrouver.

MESURES DE POLICE SANITAIRE.*

§ 1. Tout propriétaire, détenteur ou gardien de bêtes a cornes, à quelque titre que ce soit, est tenu de faire la déclaration immédiate, au bourgmestre de la commune, des bêtes malades ou suspectes qu'il peut avoir chez lui ou dans ses pâturages.

§ 2. En attendant la décision du bourgmestre, il doit les tenir renfermées et isolées de manière qu'elles ne puissent avoir aucune communication ni avec ses bestiaux encore sains ni avec ceux d'autrui.

§ 3. Il est tenu aussi d'appeler immédiatement le médecin vétérinaire pour faire constater l'état de son bétail.

4. Doivent être considérés comme suspects, aux termes de la loi, les bestiaux qui ont été en contact direct ou indirect avec des animaux malades.

§ 5. Les propriétaires de bétail qui ne remplissent pas les prescriptions mentionées aux §§ 1, 2, et 3, encourent, selon les cas, des amendes de 16 à 1,000 fr. et un emprisonnement de six jours à cinq ans; ils perdent de plus tout droit à l'indemnité qui est accordée en cas d'abatage des bestiaux malades ou suspects.

§ 6. Dès que le bourgmestre est prévenu de l'existence d'une maladie contagieuse ou suspecte dans une ferme ou dans un pâturage de sa commune, il doit immédiatement faire visiter le bétail qui lui est signalé par le médecin vétérinaire du gouvernement, si déjà cette visite n'a pas eu lieu à la demande du propriétaire.

§ 7. En attendant le résultat de cette visite, le bourgmestre doit faire isoler, si cela n'a pas déjà eu lieu, les bestiaux malades, en prescrivant que les animaux suspects, à raison de leur contact avec ces derniers, soient tenus enfermés dans l'étable où ils se trouvent, et mieux encore dans un local autre que celui où la maladie s'est développée. Cet isolement et cette séquestration seront, en tout cas, complets, et il ne pourra y être rien modifié sans des ordres formels soit du bourgmestre, soit de l'autorité supérieure.

§ 8. Lorsque le bétail est du pâturage, l'isolement est également obligatoire, et, s'il est impossible sur le pré même, les bestiaux suspects devront être enfermés dans des étables appropriées.

§ 9. Quand il résultera au rapport du vétérinaire qu'une ou plusieurs bêtes sont atteintes du typhus contagieux, le bourgmestre donnera l'ordre immédiat de les faire abattre en présence d'un officier de police, après avoir fait constater leur valeur par deux experts nommés et assermentés par lui.

§ 10. Le bourgmestre ou le médecin vétérinaire doivent, en tout cas, singnale *de suite et par voie directe* au gouverneur de la province, les faits qu'ils ont observés, en indiquant:

1° Le nombre des bestiaux abattus;

2° Le nombre de ceux qui, à l'étable, au pâturage ou ailleurs, ont été en communication médiate ou immédiate avec les malades;

3° Les dispositions prises à l'égard de ces derniers.

§ 11. Le bourgmestre agira ensuite à l'égard des animaux suspects, à raison de leur contact direct ou indirect avec des bêtes infectées, selon les instructions qui lui seront transmises par le gouverneur. En attendant, ces bestiaux devront rester séquestrés, comme il est dit aux §§ 7 et 8, et visités tous les jours par un officier de police, chargé de faire rapport au bourgmestre.

§ 12. En tout cas, les cadavres des bestiaux malades, qu'ils soient morts naturellement ou qu'ils aient été abattus, doivent être enfouis à une distance aussi grande que possible des habitations, dans des fosses de deux mètres au moins de profondeur dans les térrains peu perméables, et plus profondément encore dans les terrains dont la perméabilité est très-grande. Cette fosse sera recouverte de toute la terre qu'on en aura extraite.

§ 13. S'il était possible de jeter au préalable sur les cadavres une couche de chaux vive, il faudrait user de cette précaution.

§ 14. Les peaux devront être tailladées avant que le corps soit placé dans la fosse, afin d'annuler leur valuer commerciale, pour que personne ne soit tenté de les déterrer. Les cadavres ne seront pas traînés vers le lieu de leur enfouissement, afin d'éviter qu'ils ne laissent sur le sol des matières recélant en elles le principe de la contagion. Ils devront être charriés sur des voitures traînées par des chevaux, et ces voitures seront immédiatement lavées à grande eau, après avoir servi à cet usage.

§ 15. Il est utile que le médecin vétérinaire du gouvernement dirige ces diverses opérations, de même que celles que sont nécessaires pour purifier et assainir les étables.

§ 15. Des que le bourgmestre aura acquis la preuve que l'épizootie s'est déclarée dans sa commune, il devra en instruire tous ceux de ses administrés qui ont du bétail, par affiche ou autrement, en leur enjoignant de déclarer immédiatement à l'autorité locale le nombre de bêtes à cornes qu'ils possèdent, avec désignation d'âge, de taille, de poil, etc.

§ 16. Les habitants des communes infectées doivent être informés en même temps que, en vertu de la loi et sous peine de 100 à 500 francs d'amende, ils ne peuvent conduire aucun de leurs animaux, même sains, aux foires et marchés, ni aux pâturages communs ou même chez des particuliers, dans les localités voisines. Toute communication des bestiaux des communes infectées avec ceux des localités qui ne le sont pas doit être absolument empêchée. Il doit être fait, en conséquence, des visites de temps à autres chez les propriétaires de bestiaux dans les communes infectées, pour s'assurer qu'aucun animal n'a été distrait de leur troupeau.

§ 17. Si, au mépris de ces dispositions, une bête malade ou suspecte, dans un pays infecté, était conduite sur un marché ou une foire, ou même chez un particulier d'une localité non infectée, l'auteur de cette contravention serait passible des peines portées par les articles du Code pénal qui ont réglé cette matière, et le bétail devrait être abattu.

§ 18. Les propriétaires qui feraient conduire leurs animaux malades ou suspects par leurs domestiques ou d'autres personnes, dans les marchés ou les foires, ou dans des localités non infectées, seraient responsables des faits de ces conducteurs.

§ 19. Les propriétaires de bêtes saines peuvent néanmoins, dans les pays infectés, en faire tuer chez eux ou en vendre aux bouchers, mais aux conditions suivantes:

1° Il faut que le vétérinaire du gouvernement ait constaté que ces bêtes peuvent être livrées sans danger à la consommation;

2° Le boucher doit tuer et dépecer les bêtes sur place et dans les vingt-quatre heures;

3° Le propriétaire ne peut s'en dessaisir et le boucher les tuer, avant qu'ils en aient reçu, par écrit, la permission du bourgmestre, qui en fera mention sur son état;

4° Le boucher ne peut, sous aucun prétexte, vendre pour son compte et sur pied la bête qu'il aura achetée pour être immédiatement abattue.

Toute contravention à cet égard sera punie conformément aux lois et règlements sur la matière. Le propriétaire et le boucher sont solidaires.

§ 20. Les propriétaires jouissent de la même faculté de disposer des bêtes qui sont devenues suspectes par suite de leur contact avec des animaux malades, lors même que l'abatage a été ordonné par l'autorité.

Seulement, dans ce cas, outre les précautions indiquées au § 19, il faut que la peau tailladée et les autres débris soient enfouis conformément aux prescriptions des §§ 12, 13 et 14, et que le transport de la viande se fasse de manière que la salubrité publique ne puisse pas avoir à en souffrir.

§ 21. L'expérience ayant appris que les chiens peuvent devenir des agents de transmission de la contagion, ces animaux doivent être tenus à l'attache dans les localités infectées; et il est ordonné de tuer tous ceux que l'on trouverait divagants.

§ 22. Les bourgmestres des communes qui, sans être infectées, peuvent avoir à craindre l'invasion de la maladie, à raison de leur voisinage avec des localités où règne le typhus, doivent prescrire le recensement du bétail, comme il est dit au § 15, et ne laisser introduire sur leur territoire

* Toutes ces mesures sont prescrites par les lois et les règlements sur la police sanitaire des animaux domestiques. Celles de ces dispositions légales qui sont obligatoires en Belgique sont: 1° les arrêts du Conseil d'Etat du 19 Juillet 1746 et du 16 Juillet 1784: 2° le décret du 28 Septembre 6 Octobre 1791: 3° l'arrêté du 27 messidor an V, rendant obligatoire la circulaire ministérielle du 23 du même mois; 4° les art. 459, 460, 461, et 462 du code pénal; 5° l'arrêté royal du 22 Mai 1854, modifié, en ce qui concerne le typhus contagieux, par l'arrêté royal du 3 Septembre 1865 et par l'arrêté ministériel du même jour.

aucune bête, avant que celle-ci ait été visitée par un médecin vétérinaire. En cas de maladie, l'abatage doit être ordonné par l'autorité compétente, et lors même que le bétail est sain, le séjour dans la commune ne doit être permis que sous reserve qu'il sera isolé pendant dix jours au moins.

§ 23. Comme il importe que les propriétaires soient indemnisés pour le bétail sacrifie dans l'intérêt public, il leur sera alloué: 1° une indemnité des deux tiers de la valeur de chaque bête malade et abattue; 2° une idemnité équivalente, outre la faculté de disposer de la viande, conformément aux §§ 19 et 20, pour chaque bête suspecte par suite de son contact avec les animaux infectés.

Cette indemnité ne sera toutefois allouée que pour autant que les propriétaires aient rempli les obligations rappelées aux §§ 1, 2, et 3.

§ 24. Le bourgmestre devra transmettre immédiatement au gouverneur de la province sa proposition d'indemnité, en y joignant: 1° l'ordre d'abatage donné par lui ou par toute autre autorité compétente, avec le rapport du vétérinaire qui l'a provoqué; 2° le procès-verbal d'expertise; 3° le certificat d'abatage,—le tout conformément aux dispositions qui existent en cette matière.

§ 25. Les fumiers provenant des étables infectées devront être enfouis.

§ 26. Comme les fourrages sur lesquels les bêtes malades ont soufflé et répandu leur bave, et les litières qu'elles ont souillées de leur déjections, peuvent être des agents de transmission de la contagion, les uns et les autres devront être détruits ou enterrés. Le lavage a fond des étables avec des liquides dont les propriétés désinfectantes sont reconnues, tels que le chrorure de chaux, l'eau de chaux chlorurée, les solutions d'acide phénique, les eaux de lessive, le grattage des rateliers et des mangeoires, leur revêtement avec une couche de goudron, le repiquage du sol et l'association à la terre qui le forme, de sable, de terre ou de plâtre coaltarés, enfin les fumigations chlorurées, voilà une série de moyens dont l'experience a consacré l'efficacité.

§ 27. Même après ces précautions prises, il sera prudent de n'introduire des bêtes saines dans les étables infectées qu'après deux semaines au moins, pendant lesquelles on les aura laissées ouvertes à tous les vents.

§ 28. Les objets qui auront servi à l'usage des bêtes malades devront être détruits par le feu, s'ils sont de minime valeur, comme les cordages d'attache, par exemple, ou purifiés par les procédes d'assainissement qui leur conviennent.

Sans l'exécution sévère dispositions mentionnées ci-dessus, la propagation du typhus dans le pays ne saurait être empêchée. Cette exécution dépend avant tout des propriétaires de bestiaux et des administrations locales. Si les premiers ne signalent pas immédiatement au bourgmestre de leur commune les maladies suspectes qui se développent chez leur betail, en le tenant enfermé, et si les seconds n'agissent pas de suite, conformément aux prescriptions qu'on vient de rappeler, la contagion ne saurait être évitée, et, dans ce cas, Dieu sait quelles pertes l'agriculture aurait à essuyer!

The importation of horned cattle into Belgium by sea or land was prohibited by Royal Proclamation on the 30th August. This prohibition was afterwards extended to sheep as well as to hides, skins, fresh meat, and unmelted tallow.

By a circular of the Minister of the Interior, dated 17th September, governors of provinces are directed to stop fairs and markets and all assemblages of cattle in the neighbourhood of any centre of infection. Animals should not be admitted into a fair unless furnished with a certificate from the authorities of the place from whence they came, stating that the plague has not existed within the commune for three weeks at least.

By a Royal Proclamation issued on the 22d September, all fairs and markets for horned cattle are prohibited, except in the case of animals destined for slaughter (*destinées a la boucherie*), and accompanied by such a certificate as is mentioned above. The introduction to this Proclamation states that every animal found to be infected had been proved to have come from some fair or market.

On the 6th October, the Minister of the Interior issues a circular to the governors of provinces, complaining that the Proclamation of the 22d September had not been properly enforced. Store stock markets had been kept open, under the pretext that they were markets for butchers' stock; an "excessive facility" had been shown in admitting animals without proper certificates, and the local authorities had given such certificates without sufficient control. The Minister directs that the *gendarmerie* shall in future exercise a "severe control" in all these respects, and shall furnish reports to the governor, which the latter shall transmit to the Ministry of the Interior.

On the 10th October the Minister makes a report to the King, stating that the measures taken have been successful.

On the 1st November Lord Howard de Walden writes—

"My Lord, Brussels, 1st November 1865.

"The 'Moniteur' of yesterday, of which I enclose a copy, has published a note on the appearance and development of the Cattle Disease in this country, and the sacrifices which have been made with a view to arrest its progress.

"It appears that the first cases were made known to the administration on the 30th of August; that since that time it has broken out in 63 localities, in 42 parishes of six provinces. To prevent contagion, 354 beasts have been killed, 242 of these being actually affected, and 112 suspected in consequence of having been in contact with the others; only 13 appeared to have died. It is very difficult to verify to what extent the 'real Rinderpest' has prevailed, but I am very much disposed to believe that a great proportion of the cattle have been sacrificed prematurely; the alarm created by the first symptoms of any illness, and the proportionally advantageous allowance made for an animal killed at an early stage, are sufficient motives for precipitancy on the part of the proprietors. The early symptoms of several cattle affections are so similar, namely, running at the eyes and nose, quick breathing, fever, and staring coats, that in the hands of veterinary practitioners, having hitherto no experience in the 'Rinderpest,' the precautionary system of destruction must necessarily cause excess of loss.

"I have, &c.

(Signed) "H. De Walden and Seaford.

"The Earl Russell, K.G.,

"&c. &c."

NETHERLANDS.

Extract from an Official Report on the Cattle Disease in the Netherlands.

(*Transmitted by H. M. Consul at Rotterdam, 4th Sept.* 1865.)

The disease has appeared in the rural parishes of Kethel, Delfshaven, Moordrecht, Vlaardingen, Overschie, Kralingen, Nieuwerkerk on the Yssel, Spykenisse, Schiedam, Heerjansdam, Maasland, Sommelsdÿk, Zevenhuizen.

At Kethel, where the disease was first observed in oxen which had been brought back from England, it increased most. At Kethel the number attacked is not mentioned, but at the other places about 60 head of cattle were attacked.

At the commencement, before the disease was known to exist, the farmers sold their cattle which showed doubtful symptoms to the butchers, so that there were few diseased cattle to be found.

Five cases, however, of cattle which had been slaughtered, but which had not died of the disease, were examined.

After giving technical particulars regarding the symptoms before and after death, the Staats Courant proceeds to state that the cause and origin are not entirely clear, as the information on these points varies.

How the disease reached England, whether the said oxen had been in contact with diseased cattle there, and had in that way brought it over to this country, and whether they actually suffered from the same disease as that now raging in England, are points not yet satisfactorily determined.

The symptoms before and after death, in connexion with what is known of the probable origin, and the course which it has thus far followed, lead to the supposition that the disease must be what is called amongst veterinary surgeons contagious typhus (typhus contagiosus bovum). Further investigation must determine whether it is this disease.

The owners of suspected cattle cannot sell them without subjecting themselves to the penalties prescribed by Art. 459 and 460 of the Criminal Code, even in cases where they are in apparently good health, whilst the dead animals must be buried entire in order to prevent infection.

The report states, that slaughtering the animals will not always be sufficient to eradicate the disease. The newly purchased cattle might again take the disease. Besides this, it must be remembered that by slaughtering in every

instance every opportunity for scientific observation is taken away, and moreover no recovered animals would be preserved, and these have the greatest value, owing to their never being attacked a second time.

If even only 20 or 25 per cent. recover, they represent a greater value than the 100 did previous to the outbreak of the disease. This last observation is particularly applicable to those districts where cattle are bred.

In districts where cattle are only fattened it might be more advisable to kill in every instance; but this is not the case in the breeding and dairy districts.

In slaughtering it will be necessary to keep the interests of the stockholders in view, and especially consider whether the disease has only just commenced or has become more general.

In the first instance, when there are but few cases, or on the appearance of the first case, the cattle should be immediately killed, without allowing any other considerations to stand in the way, in order at once to eradicate the disease.

Should the disease have become more general, the following rules might be observed:

1. In fat cattle, kill all sick or suspected animals, keeping the skin, horns, &c. in some place, under proper police regulations, until all fear of infection be passed.
   The meat and fat of animals killed in the first stage of the disease can be quite safely eaten.
2. In milk and breeding stock, separate the cattle attacked, and kill on the rapid progress of the disease.
3. In purchasing new stock, take care to obtain proper certificates of origin.
4. Isolate every infected locality, parish, or district.

The medical treatment recommended consists of hydrochloric acid, mixed with treacle, and a thick decoction of linseed.

If the animal improves, decoctions of bark, sulphuric ether, and other stimulants can be employed.

It is, however, far better to take every precaution against infection, keeping farm servants at a distance, and especially preventing cattle-dealers, butchers, and strangers, and such people as are likely to have been in contact with sick animals, from approaching the farms and meadows.

It is also advisable to avoid touching strange animals, and not to purchase too soon after having had a case of disease, without taking every precaution in the way of cleaning and disinfecting the stalls.

It is further necessary to use every means for cleaning and purifying the stalls, supplying pure water, removing the fodder and straw as far as possible from the cattle, especially if disease has made its appearance, and removing the manure, &c.

A Bill was subsequently introduced, and passed into law to enlarge the powers possessed by the Executive of restricting the importation and transit of cattle; and a strict cordon was afterwards drawn around the whole of the infected district from sea to sea.

Translation of Law to prevent the Spread of the Cattle Disease, passed October 17, 1865.

(*Transmitted by H.M. Consul at The Hague.*)

Article 1.

Whenever, on the breaking out of any infectious cattle disease at home or abroad, it becomes necessary, for the preservation of the stock of cattle, and the health of inhabitants of the country, the importation and transit of cattle from abroad, the transport of cattle from place to place within the country, and the holding of cattle markets, may be prohibited; and prohibitory and other regulations may be established respecting the declaration, sale, treatment, and infection of living or dead cattle, meat, hides, hair, wool, dung, and other offal, as well as respecting the carriage of such articles from place to place, and this independently of the regulations framed by the provincial and commercial authorities, so far as they are not inconsistent with our Ordinances.

Article 2.

The transgression of what is established by us in consequence of the preceding Article shall be punished by a fine of from 25 to 500 florins, and imprisonment of from eight days to three months, together or separately, unless other laws inflict a severer punishment on transgressors.

Article 463. of the Penal Code and Article 20 of the 29th June 1854 (Staatsblad No. 102) are applicable in these cases.

Anything removed or sold at variance with our commands, and anything wherein or wherewith the transgression has taken place, shall immediately, or as quickly as possible, be seized and confiscated; and as far as it shall be required, in the interest of health or the prevention of contagion, the annihilation or rendering harmless of it is ordered. When the general interest renders this advisable, after acquittal or discharge of the prosecution, an indemnity shall be paid, which is to be determined by the judge.

Article 3.

This law comes into force on the day of its publication in the Staatsblad, and remains in force no longer than the 1st of January 1867.

The subjoined figures are extracted from the latest official Returns published in the *Nederlandsche Staats-Courant.*

	Attacked.	Died.	Slaughtered.	Recovered.
Total from Commencement - -	6,093	2,121	1,361	1,752
Week ending 28th Oct.	678	133	133	77

SAXONY.

(*Transmitted by Mr. Eden.*)

Translation (by Mr. Eden) of Decree, 30th September 1865, respecting the Rinderpest.

The extent to which the rinderpest has spread in England, Holland, and Belgium, and the fact of its having broken out again in Lower Austria, give good cause for anxiety lest, notwithstanding all measures of restriction adopted by neighbouring States interested in arresting its progress, this destructive disease may nevertheless be introduced into the interior of Germany and into Saxony.

The Ministry of the Interior consider it, therefore, as their duty to anticipate the possible event, which will in all probability be at the time most unexpected, and to make such dispositions as to the steps to be taken in whatsoever place the disease may have broken out, as shall tend to crush it and to prevent its spreading farther.

In accordance, therefore, with the most high Decree of the 16th January 1860,* it is ordered on this subject as follows:

1.

Dr. Haubner, of Dresden, veterinary surgeon and medical adviser (medicinalrath), is appointed pest commissioner until farther notice, with authority to adopt the special precautions which may, in each particular case, be necessary to check and prevent the farther spread of the rinderpest, and to make the corresponding regulations. The orders of the commissioner must be accepted, and punctually carried out, until the Ministry of the Interior shall have otherwise ordained.

The chief district and police authorities must, upon the requisition of the pest commissioner, afford him every possible assistance.

The appointment of several pest commissioners, and the division of the land into different pest districts, is reserved in case of necessity.

2.

As soon as the rinderpest breaks out in an isolated farm, or in any place in the interior, or should cases of disease occur such as (in accordance with what is laid down in the appendix to this act) admit of the conclusion that they are cases of rinderpest, the police authorities are immediately to be informed of the fact, and the latter are without delay to require the presence of the veterinary surgeon of the district, and to proceed with him at once to an examination and diagnosis of the disease upon the spot.

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* The Royal Decree here alluded to empowered the Minister of the Interior, in the case of the rinderpest breaking out in countries bordering on Saxony, or connected with it by railway, to adopt at once all necessary measures for arresting and exterminating it.

3.

The duty of giving prompt notice of suspicious appearances in cattle, or of the outbreak of the pest, belongs, in the first place, to the respective owners, and to those who as stewards or in other menial position have the care and supervision of the cattle; but it is incumbent on all those that are in possession of reliable information.

4.

Until the arrival of the authorities and district veterinary surgeon, the domestic animals of all kinds upon the infected or suspected farm must be carefully guarded, and in the meanwhile neither animals nor infectious objects be allowed to quit the farm.

Any animals which may have died during this time must be kept in such a way that a medical dissection of them can afterwards be performed.

5.

If the examination of the veterinary surgeon results in certifying the existence of the rinderpest, or there be a well-grounded suspicion of the same, notice thereof must straightway be given, if possible by telegraph, to the chief district authorities and to the pest commissioner, and these latter are to proceed without delay to take all further necessary steps upon the spot.

In the meanwhile, however, the police authorities in concert with the veterinary surgeon of the district must shut off the affected or suspected farm, so that neither man, domestic animal, nor thing can either go in or out, and all communication with the farm be in the interval cut off.

Only those persons who are charged with certifying and exterminating the disease, or those who under special circumstances have of necessity to do with the inhabitants, such as doctors, midwives, &c., can be allowed admittance.

These latter must, moreover, on leaving the farm, undergo a thorough disinfecting process.

In the same manner with respect to the introduction into the farm in question of any may-be necessary means of life, those particular precautions must be taken which are best suited to the circumstances.

6.

When the veterinary surgeon of the district or the pest-commissioner declare that the nature of the particular disease can only be ascertained with certainty from the results of dissection, one of the diseased head of cattle still living may be killed in order that it may be dissected. The owner of the beast cannot hinder its being killed, but has a claim to full compensation for the dead animal, which is to be awarded him out of the public treasury. For this purpose the head of cattle is, before being killed, to be estimated according to its actual value before two impartial experts who are to be put upon their oath. If the result of the dissection shows that the beast which has been killed suffered from rinderpest, then the whole of the value fixed by estimation is to be awarded, in other case the value of those parts which may still be used must also be taken in account.

7.

In cases in which it has not for the moment been possible to make completely sure of the presence of rinderpest, the enjoined shutting off of a farm is to continue until, through farther observation and inquiries, every suspicion of the presence of this disease has been removed, and until the withdrawal of the prohibition has been ordered by the police authorities of the district in conjunction with the pest commissioner.

If, on the other hand, the disease is recognized as the rinderpest, the pest commissioner and the authorities have to pronounce as to whether the mere cutting off of the farm from all communication will be sufficient, or whether the whole or part of the locality must be shut off (ortsperre).

In this case, the enjoined cutting off from all communication is to last until the rinderpest is locally exterminated, the process of disinfection brought to an end, and the prohibition of communication with the rest of the country expressly removed, with the consent of the pest commissioner, (in the case of the whole place (ortsperre) by order of the chief authorities, and, in the case of a single farm, by order of local police authorities).

8.

Every head of cattle attacked by the rinderpest, and every head of cattle which, though at the time it appear sound, is suspected, is to be straightway killed, and to be buried in some fitting pit, precisely in the same way as that which dies by the disease.

So, likewise, as may be found expedient, are all things found in the infected place, which may be thought likely to retain the virus of the disease (such as stores of provender, manure, &c.) to be destroyed.

9.

The place (*eadaver-gruben* or *grubenplatz*) which the pest commissioners and the local authorities respectively think suited for a burying place for the cattle destroyed by the rinderpest or killed on account of the disease, and which they are to fix upon close at hand in the lands of the infected locality—and only if unavoidable in the neighbouring land—must be given up by the proprietor, for so long as it shall be forbidden to make use of it for any other purpose, for a full indemnity, to be paid out of the state treasury, though without waiting for the amount of the same to be fixed by estimation, which need only be done later.

10.

In places where the rinderpest has broken out, every inhabitant is strictly bound, when called upon by the authorities, to afford, either himself personally or through other proper persons, the necessary assistance in carrying out all measures which are required by circumstances or officially commanded, among others especially in killing cattle, burying that which has died or been killed, making the dead pit, filling up and fencing in of the same.

Assistance may, however, be sought for, in cases of necessity, in neighbouring places likewise.

11.

Appeals and other legal measures resorted to against the orders promulgated by the competent authorities for the purpose of exterminating or arresting the progress of the rinderpest have no power to suspend those orders.

12.

The owners of cattle which dies by the rinderpest, or which is killed in accordance with the police measures taken against the disease, as also the owners of infectious articles destroyed by order of the authorities (with the exception of the cases mentioned in paragraph 8, under heading *a*, *b*, and *c*, of the most high Decree of January 16th, 1860), shall receive full indemnity out of the state treasury.

13.

The fixing of the indemnity will be proceeded with in the manner prescribed in paragraphs 10, 11, and 12 of the same high Decree; only whensoever this mode of proceeding is not practicable, and it is found impossible to arrive at a voluntary agreement as to the proper indemnity to be paid, then it must be done by a local valuation on the spot, in each particular case, according to the actual value of the articles to be destroyed, after the actual and local prices at the time.

The local administrative authorities have to cause the valuation which is made with a view to indemnity to be proceeded with before two experts upon their oath, and have to acquaint the owner at once with the result. They have to draw up a legal act (protocol), of the valuation in the same way as in the case where a free agreement may be come to.

14.

In fixing the indemnity for the place used as a pit, which is also the duty of the local administrative authorities, the latter have to make an analogous application of the dispositions in paragraphs 7, 8, 9, 13 and 14 of the decree of the 3rd July 1835 (Gesetz und Verordnungsblatt ejusd. ac. seite 374 ff.) and, with the assistance of two sworn experts, to settle the amount of the indemnity reckoned for every year during which the spot of land was not allowed to be used.

To the state treasury belongs the choice either to pay the indemnity yearly, or all at once, for the whole time that the land was in disuse, with the just and right deductions, however, for the prepayment.

The fixing of the amount of the indemnity may, in cases of necessity, be postponed until after the removal of the prohibition to communicate with the place (aufhaltung der ortsperre.)

15.

Against the amount of the indemnity to be awarded according to paragraphs 6, 13, and 14, and to be fixed by valuation, there can be no appeal in the way of the administration on the part of the interested proprietors. On the other hand, a protest will not hinder proceeding to the killing of the cattle, the destruction of infectious articles, and the taking possession of the place for a pit.

16.

The payment of indemnities awarded out of the state treasury should take place without delay after due notification of the same has come in. To this end, the administrative authorities of the district must, without loss of time, send in a report, accompanied by the acts of the valuation or of the voluntary agreements respectively, to the Ministry of the Interior, which latter will thereupon take all further steps with a view to the payment.

17.

The disinfecting processes to be followed after the disease is eradicated, and before the prohibition to communicate with the place is removed, are to be carried out under the direction of the pest commissioner or district veterinary surgeon, and must be superintended by the latter.

18.

The expense of the measures adopted on account of the rinderpest will be borne by the state exchequer.

The following are, however, exceptions :—

a. In the case mentioned in paragraph three of the high Decree of the 16th January 1860,* in which the expenses must be borne by the offender;

b. The cost of disinfecting infected buildings and utensils, which, in the case of each separate farm, must be met by the proprietor; and

c. Any compensation which may have to be made for the services mentioned in paragraph 10, as also for assistance and labour necessary for the support of persons who, in accordance with measures adopted for the purpose, are cut off from communication with the rest of the country, also for the keeping up of their property, likewise, finally for keeping the watches which have to be set in the diseased locality.

The amount of this expenditure must be raised by the communes of the infected locality, and in case of a piece of land being concerned which is not included in the circle of the commune, with a proportional contribution on its part.

In the case of such non-included isolated bits of land which do not come within the boundaries of a place (ortschaft), the expense must be borne by the proprietor of the land; while the duties, on the other hand, mentioned in paragraph 10, fall, in this case, on the inhabitants of the nearest place (ortschaft—commune or parish).

19.

Should the disease attack the sheep and goats, the preceding regulations must be analogously applied.

The killing, however (ordered in paragraph 8), of these animals who may still be sound, but which are suspected through their standing in contact (with diseased beasts) is left for the consideration and regulation of the pest commissioner at the particular time.

20.

All measures which may, according to circumstances, be otherwise necessary for the extermination of the disease and the prevention of its farther spreading, as, for instance, prohibiting of cattle markets in the diseased locality and the neighbourhood, barring of public ways, &c., must be left, in each particular case, to the conscientious discretion of the pest commissioner and the chief district authority, and must be specially ordered by the latter with the agreement of the pest-commissioner.

21.

All contraventions will be punished according to paragraph 3 of the most high Decree of January 16th, 1860.†

This decree is to be diligently observed until further notice.

Dresden, 30th September 1855.

Ministry of the Interior.

(Signed) Baron de Beust.
Smiedel.

Translation of Supplement or Appendix to the above Decree.

The rinderpest (also called Löserdurre, Viehseuche) is a foreign disease which among us never arises spontaneously from indigenous causes. It originates in the Russian steppes, whence it is introduced into other countries by *contagion*. Different from indigenous diseases, it is not in the least dependent on external influences, such as the season, weather, food, &c., by which it can neither be advanced nor averted.

The original introduction of the disease from the Russian steppes into the countries of Europe lying to their West is always a result of importation of the so-called Podolian or steppe cattle. The farther spreading from land to land may however take place in many ways.

Here also the introduction of the disease is, as a rule, brought about by the importation of cattle from the infected locality. It may, however, likewise be introduced in other ways, especially when the disease has already entered neighbouring countries, as, for instance, through everything which has had to do with sick cattle, as meat, fresh hides, horns, &c.; and again also through the so-called infectious articles, such as furs, wool, wearing apparel, &c.; and finally through domestic animals, as sheep, goats, and swine, whenever the latter have been in contact with diseased beasts or breathed the same atmosphere. The means of contagion are consequently many and manifold.

The rinderpest is for our native cattle the most dangerous disease which exists. A loss of 90–100 per cent. must always be reckoned upon; only in especially favourable circumstances does this turn out to be something less. Among the steppe cattle and the allied races, on the other hand, the disease is much milder, the loss being here only to be estimated at from 50 to 60 per cent., while it may indeed be less, but rarely exceeds this figure. Moreover, the rinderpest is not alone confined to horned cattle (cows, oxen, &c.); it may also spread by contagion to sheep and goats, and here also be very destructive. The loss is however less here than among indigenous *cattle* (rind-vieh, cows, oxen, &c.), and may be estimated by the results of former experience up to the present time at from 50 to 60 per cent.

Means of cure there are none. Everything that has been tried has been found useless, and every attempt at curing is for this very reason dangerous, namely, in that the disease is meanwhile retained, and the development of contagious matter stimulated. There are but two effectual ways of arresting the devastating progress of the disease, namely:

1st. Every head of cattle attacked by the disease or through being in contact with sick cattle suspected of it must, although healthy at the time, be straightway killed; and

2d. The infected farm shut off from all communication (gesperrt werden) until it has been disinfected.

By such means the disease is nipped in the bud, and its farther spreading thus averted.

The sooner these measures are set to work the surer is the result, and, on the whole, the less is the loss, although the latter may at the moment appear very great.

It all, therefore, resolves itself into this, to recognize the disease immediately on its breaking out; and it is therefore requisite that all cases of attack by the disease, and all suspicious cases of sickness, should at once be brought to the knowledge of the authorities. With a view to render this possible an enumeration of the most important symptoms of the disease, and the most important phenomena revealed by dissection, is here added.

Symptoms of the disease.—The animals fall off from their feed, and finally refuse to eat at all. Rumination takes place irregularly, continues only for a short time, and soon leaves off altogether. But little milk is secreted, which in the case of milch cows is usually the first striking symptom of the disease. The excrement is sluggishly evacuated, and of a dryer quality; the urine less in quantity. The hind quarters are somewhat blown up (angedostel), while at the same time slight pains in the stomach are felt (the beast looks round at its own body). Meanwhile the animals are dull and dejected (only at times is there a temporary animation), hang down their head and ears, evince weakness of the back (loins) in their movements, and generally stand with the back somewhat bent and the feet under the body (i.e. they stand over). With all this is associated evident aguish fits, manifested by changes of temperature, also hair standing on end, &c., and an increased sensitiveness along the vertebral column when the latter is pressed.

None of these appearances, however, are in themselves in the least characteristic. They especially announce nothing more than feverish suffering in the hind quarters, and are present also in cases of so-called indigestion or stoppage of the bowels.

Very soon, already on the second or third day, other symptoms, namely, those of catarrh, appear, and these confirm more than ever the suspicion of rinderpest. To these latter belong redness and tear drops in the eyes; first a watery and then a slimy running at the nose; increased warmth and slobbering in the mouth, in which, moreover, red spots are often to be found in the gums, palate, and lips, which afterwards develop into sores

* § 3. punishes the offender against the special regulations on this subject, and makes him responsible for all damages resulting from his infringement of the same.

† This paragraph in question visits all infringements against the pest regulations with imprisonment up to 18 months, and liability to the amount of the damage consequent upon the special infraction of the law.

(erosions). To this may now be added a more or less hurried, heavy, breathing, accompanied at length by moaning and heavy groaning, and a frequent hollow feeble cough. Still later comes a frequent bad dysenteric discharge from the bowels, in which the evacuations are of a putrid nature (gauchige) and of a brown colour; they are likewise mixed with blood, and of an exceedingly foul odour; they come at last involuntarily and by fits and starts, and accompanied by straining of the bladder and open inflamed gut (offenstehen des afters).

The weakness and increasing feebleness becomes greater and greater. The beasts can hardly keep any longer on their legs, totter in walking, lie down a great deal,—at last almost uninterruptedly, and can no longer get up from their litter. Rapid emaciation sets in, the limbs become cold, the eyes sink back into their hollows, the breath becomes stinking, and so, with symptoms of complete exhaustion, death supervenes, generally between the fifth and seventh day, though also sometimes earlier or later.

Not even these appearances are, however, in themselves characteristic; the heat and the slobbering of the mouth, as also the red spots and sores, recall to mind the mouth disease (Maul-seuche), the redness and water in the eyes and the running at the nose recall to mind the so-called disease of the head (Kopfkrankheit), the rapid breathing and the cough are likewise to be found in cases of disease of the lungs (Lungenseuche), while the dysenteric evacuations may pass for dysentery itself; but in this *succession one upon another*, and in this *connection with one another*, they are only met with in the rinderpest.

In order, therefore, to recognize the rinderpest with certainty, it becomes necessary to be able to watch the whole course of the disease, and, furthermore, to corroborate the results arrived at from observation of the living animal by the phenomena brought to light by dissection.

Results of dissection.—The most important and constant appearances are to be found in the stomach and bowels, and they alone are to be mentioned here. The two first stomachs show no essential symptoms. The third stomach* (Psalter, Buch, Löser, Blättermagen) is, on the other hand, almost invariably choked with fodder, which is introduced in layers of dry, friable, apparently scorched slices between the single leaves (whence the name Löser-durre†). The leaves themselves are friable (mürbe), and traversed by blood-vessels; the warts (wärzchen) are saturated with blood, and the inner skin or epithelium is often loosened and separated, and remains sticking to the layers of food. Only exceptionally, for instance when soft green food has been introduced, does the stomach contain soft, pasty masses of fodder.

The runnet (fourth stomach) and the intestines already appear externally more or less bluish red and inflamed. This is, however, especially the case with the inner mucous membrane.

The kind of inflammation which is here present is of a peculiar sort, and in particular is characterized by ersudate‡ and apparently ulcerous conditions, the full and proper appreciation of which is only possible to professional persons. The greater intestines likewise partake of these inflammatory symptoms, although to a less striking extent. The liver is usually blood-red and soft (mürbe), and the gall-bladder over filled with gall (whence the name Uebergalle).

The results of dissection, again, resemble those obtained in the case of other diseases, as, for instance, in the so-called buch-brand (inflammation of the leaves of the psalterium) and in dysentery; and here, again, profound technical knowledge is necessary in order to be able to arrive at a solid and sure diagnosis.

To confirm the results of the latter, both the progress of the disease and authentic proof of contagion will be found of service in any case. Of the latter enough has been said at the commencement; with regard to the former, attention may be called to the following:—

As a rule the disease attacks at first only a single head of cattle; then later, generally on the fifth or seventh day, a second or a third head is attacked, after which more frequent cases (in the case of large stocks of cattle almost daily cases) occur, until at length all the cattle is attacked.

On the whole, then, in spite of the difficulty of a sure and indubitable assurance of the disease, there are, nevertheless, many signs which enable even one not technically acquainted with the subject to recognize those cases of sickness which are either cases of rinderpest, or at least give rise to well-grounded suspicions that they are cases of rinderpest.

* Book, tripe, psalterium.

† The stomach in question is called the *Löser-magen*, as it finally dissolves the food prepared by the other two stomachs. In this disease, however, it becomes dry and inflamed, retaining the undigested food in powdery layers, between the leaves of which it is composed.

‡ Ersudate is a matter produced by perspiration.

AUSTRIA.

EXTRACT from the GENERAL REGULATIONS in force in the AUSTRIAN EMPIRE relating to DISEASES of CATTLE.*

(TRANSLATION.)

1. THE CATTLE PLAGUE.

Introduction and spread.

§ 42.

The cattle plague, one of the most devastating pests, which annihilates the prosperity of whole communities and districts for many years to come, but which attacks the cattle only once in their lifetime, never originates (as experience has shown) in the provinces of the empire, but is always imported in the course of cattle traffic from Russia, Moldavia, and Wallachia, or it is imported in consequence of the intermixture of the home cattle of the frontier localities with those of foreign East; but when once imported in the country, it spreads by the operation of the air which developes itself during the epidemic state in all parts of the infected animal, in the exhaled breath and in the skin evaporation of the same, throughout the whole of the native cattle, and becomes by the approach of the sick with the sound, or by the intercourse of the people to whose clothes the infectious matter adheres, as also by the importation of the productions of the sick animals, etc., etc. a wide spread contagion, if no limits are set to it by strict efficacious measures.

These measures can only be directed:

1. To prevent the plague from being introduced from the land of its home;
2. To destroy the imported plague as quickly as possible, by destroying all the vehicles and organs of the contagion.

A) *Preventive measures against the importation of the danger.*

1. Cattle quarantine.

§ 42.

As the danger is continually threatening, of importing that plague from the foreign countries of the East, there must continually exist measures to guard against it, even in times when nothing of its existence in Russia, Moldavia, and Wallachia is heard of; these measures consist in quarantine institutions.

All the cattle imported from the above countries, which ought always to be suspected as being the home of that plague, ought only to be permitted to come into the lands of the empire by certain frontier spots, where they must be kept for a certain period in quarantine asylums. The duration of the quarantine is to depend on the circumstance whether the plague prevails in the neighbouring foreign places to a greater or smaller extent at the distance of the frontier. The quarantine may thus be limited to a few or 21 days duration.

Should it appear that instances of the plague have occurred close to the frontier, or that the plague prevails abroad to an alarming extent, and that consequently it may be reasonably expected that the herds, though originally healthy, will have to pass pestilential districts, when they will be found suspected of infection, it may then be justifiable to prohibit altogether the importation of cattle from Russia, Moldavia, and Wallachia for the time being, i.e. so long as the plague prevails.

The cattle arrived in quarantine establishments, though they may seemingly appear healthy, are to be lodged in fenced spaces, separately, fed by particular separate guards, and be carefully examined by doctors during the whole period. Those herds which by first examination show indications of the disease must at once be dispatched back over the frontier. Should, during the quarantine period, show no instance of the disease amongst the herd, they may pass into the interior provided with a passport of sanity. Should, however, during the time, occur a case of disease, its nature is to be thoroughly examined and watched, and if it should be judged to be a case of the prevailing plague, the whole herd is then to pass a renewal of the quarantine of 21 days, always counting from the last day of either recovery or death, and the herd is only then to pass free into the interior if no new case of the disease shows itself during the whole period amongst any of them.

It is understood that the fenced spaces (okels) of the quarantine establishments where the diseased cattle are lodged, must be cleansed and purified according to pre-

* Extracted from a copy of the Regulations (which are of considerable bulk) transmitted by Lord Bloomfield. Translation furnished by the Foreign Office.

scribed regulations, before other herds are admitted into it to undergo the same process.

If steppe herds are met with in the interior which are not provided with the regular marks of quarantine or passport of sanity, they are at once to be stopped while their owners or herdsmen have to appear and show that the herds in question are either of inlandish extraction or been in the country for at least three months past, which proofs are to be delivered to the provincial authorities of the sanitary regulations of the place.

These passports must contain *a*) the number of the herd, *b*) the names of the owners or drivers, *c*) the name of the place whence the herd comes, *d*) the particular race and other indication, *e*) the place whither they are destined and the way by which they are to arrive thither, *f*) the day of their departure, *g*) the certified evidence of their perfect sanity or soundness testified by the officers appointed for their examination or inspection. If such evidence cannot be produced, the cattle thus stopped must be confined into particular pasturages and spots without the borders of the locality, and must not come into contact with the native cattle for 21 days quarantine.

Should in the meanwhile single instances of suspicious symptoms manifest themselves, the diseased animal is to be killed and interred according to regulations, while the merely suspected one is to be watched, thoroughly examined, and pass through a quarantine of 21 days, counting from the last day of either the death or recovery of the animal, after which, if it be found sound, it is to be let free. The same process must also be observed with cattle which are marked with the regular quarantine sign, or provided with a sanity pass, if during their march, isolated cases of the plague occur amongst them.

Only when it is easily possible to carry such diseased cattle from the spot where they have been stopped, to the railways, it is permitted to transport all such killed animals, after the diseased pieces were duly interred by rail to the larger towns, where considerable meat consumption exists. The same may also be done, if the place where the cattle were stopped, is near a large town, so situated that the cattle could not reach it on the usual roads.

2. Precautionary measures, with regard to traffic with animal productions, and intercourse generally.

§ 43.

As not only the diseased animals themselves are the bearers of the malady, but also their horns, skins, hoofs fat and flesh, &c., bear within themselves the infectious stuff of the disease, particular attention is therefore to be directed to these animal productions at their importation from the above countries, and namely:

a) Skins may only be imported when perfectly dry and hard. Fresh skins are only allowed to pass the frontier after having undergone the process of disinfection by the vapours of sulphuric acid, according to § 29.

b) Horns and hoofs must be immersed for 12 hours in salt-water (10 lbs. of rock salt to one pail of water), must be frequently stirred and dried, while the tips of horns must be well washed with salt water and well dried only.

c) Melted fat or grease can only be admitted in casks; the melted tallow in abundant wrappings, can only be admitted after these coverings have been destroyed or cleansed on the frontier.

d) Unmelted tallow and raw meat are to be refused entrance.

If the malady prevails extensively in the neighbouring foreign states, the authorities may for the time being prohibit the importation of cattle generally, and in fact of all productions coming from the infected places.

Should the plague break out in districts close to the frontier, all sorts of sheep, goats, and swine are not to be admitted, and particular attention is to be paid to dogs and fowls which frequently carry about the disease, and it is desirable to check as much as possible their wandering about, especially the former. Persons coming from infected places as also cattle dealers, butchers, tanners etc. are to be refused entrance, or must undergo the usual quarantine process, while all intercourse is strictly prohibited with the infected place itself.

3. Watching over the Herds.

§ 44.

It frequently happens that cattle, though they did not during the observations made while in quarantine show any symptom of the plague, have at a later date fallen a victim to the disease, while on the other hand many herds which have been smuggled over the frontier, cannot undergo close inspection, and thus give great occasion for infecting the native herds with the malady, great attention and watching are therefore necessary over such cattle during their walk to their destination. Such cattle must be strictly held to walk through the streets appointed by the local authorities, as removed from habitations, and provided with separate rations of fodder, and resting stations. It is therefore inadmissible that such herds of oxen should be fed or pass the night in the close vicinity of inhabited localities or in commons.

Careful attention must be paid to the circumstance, that the inhabitants of those localities in the vicinity of which herds of cattle are passing, should strictly observe the prescribed rules sketched out in §. 6, and repeat occasionally the proper instructions concerning the proceedings with the diseased cattle, and more especially as regards the contents of §. 18.

During their progress, such foreign cattle must be frequently inspected and examined on certain spots and points appointed by the local inspectors, but more particularly at the point of transition over the frontier from one Crown land into another, and see that none of them shows symptoms of the disease, and that their number is complete. If the cattle be found sound and the sanitary passport in perfect order, the inspector of the commission is then to join his own certificate with that of the origin and sanitary condition of the cattle. But if on the other hand a deficiency is observed in the number marked in the passport, the herd is to be stopped and the driver required to explain the cause of the diminution, which explanation is to undergo a searching investigation. Should it be found that one of the number has remained behind or even died, on account of or from disease, the nature of the disease or its cause is at once carefully to be investigated, and the result must show whether the whole herd is at once to undergo quarantine, or allowed to pass on, but the inspector is in either case bound to report to the district authorities.

But even in case the whole herd is allowed to pass on, the report must not omit to mention the deficient number, its cause, and the remaining number of the cattle. The sale of such cattle can only be permitted to take place in localities where the authorities together with a doctor or veterinary surgeon, can order a regular thorough inspection of the cattle before they are sold, and see whether they are in perfect health, and if so, to be deducted and written off in the passport, while the purchaser is to receive a new certificate clearly stating the name of the driver of the herd, and the date when the sale was made, not omitting to fill up the blanks concerning the original certificate with regard to the sanitary condition of the herd. These certificates are to be produced by the purchaser to the local authorities of his home when a new inspection of the bought cattle is to take place.

If one of the number must from illness remain back, the local authorities are strictly forbidden to allow such a cattle to be harboured in the premises amongst the other cattle, while they are bound to use even force, and against the will of the driver, to confine it in a separate stable until the termination of the disease, where it is to be fed and attended to by separate servants chosen for the purpose, and where no other cattle is to be admitted. Should the owners or drivers not consent to the process, the diseased beast is to be killed on the spot, and buried deep underground, that no injury may arise from the flesh and other parts of it, while the skin, after its purification according to § 29, is to be given up to the owner, or bought of them at a certain price.

It often happens that during long journeys, secret sales of the herd are made, among which are heads suspected of the disease, and are secretly slaughtered under some pretext or other, and thus promulgate the plague by infection. To meet this evil, the authorities must see that all foreign cattle destined for home consumption should, if possible, even in times free of the plague, be directly transported by rail to their destination.

Watching over the Cattle Markets.

§ 45.

In localities where cattle fairs are held, all foreign beasts are to be harboured at spots removed from the usual market place, and which spots must be properly cleansed before the native beasts are admitted into it. On each of such market days, the native cattle must not be driven to the pasture fields, but each possessor of such cattle must keep them confined in the stable; nor can admittance therein be given to the foreign cattle, nor pens be built for them on the commons, or allow them to drink of the vessels from which the foreign beasts have drunk, or give to the native cattle the remnants of the fodder left by the former.

Particular regulations respecting the cattle markets are found in §§ 3, 4–7, which must be strictly observed.

B) *Measures for guarding Cattle from the Plague as soon as it has broken out in the Country.*

1. Measures for the safety of cattle in the different Crown lands or districts.

§ 46.

If, in spite of the foregoing preventive measures, the plague has actually found its way in a province, the provincial authorities are at once to announce the fact (in urgent cases by telegraph messages) to the authorities of the neighbouring Crown provinces, that they may at once take the requisite steps for the safety of their respective districts. The nature of those steps will depend on the extent of the spread of the plague, on the extent of the intercourse existing between the Crown lands among themselves, and on the degree of the distance of the frontier where the plague prevails.

When the danger is in the proximity of the province, or on the frontier, it will be necessary to draw a bar or cordon, and debar all intercourse with persons dealing in cattle or their productions, &c., &c.

The following steps are urgent and necessary in that respect:

1. Watching over the frontier by posting guards on the prominent roads leading from the infected districts; these guards must uninterruptedly keep and watch on their appointed spots, and see that no cattle product or even persons step over the cordon from the infected provinces. Consequently no waggons driven by oxen or cows, no cattle, not even calves and cows, are to be allowed to pass the bar, from the infected province, but are to be driven back across the frontier.
2. If the importation of cattle from one province into another necessary for consumption especially of the larger towns, cannot be possibly prevented, the transport, where it is feasible must be effected by rail, during which transit no cattle sales ought to take place. But if it cannot be effected by rail,
3. The authorities are to fix certain stations, by which alone cattle may pass, and where inspectors are to be stationed (consisting of the members of the sanitary commissions and police staff) whose task it should be to examine the cattle and compare them with the certificates brought with them. In case of doubt or suspicion whatever, the drover is regardlessly to be shown back, and due report of the fact given to the superior authorities. But should the examination of the drove prove satisfactory, allowed to pass the bar, they must strictly keep on the roads prescribed for their passage, and where on certain points the examination is to be repeated by appointed inspectors, and treat the drove according to the regulations of § 44.

It is self-evident, that such cattle coming from infected provinces, are to undergo a more rigorous examination (§ 44.) than they would in times free of the plague.

4. At the time when these cattle pass through the different places which lie on the roads fixed for them, the home cattle must be kept in their respective stables, nor are their attendants allowed to come near those droves during that time, when it is also forbidden to drive cattle on the open roads, generally.
5. Raw meat, entrails of cattle, fresh bones, unmelted grease, skins, horns, hoofs, are strictly prohibited to be imported, while melted grease, dry bones and skins (if provided with certificates showing that they came from sound parts) are permitted to be imported, as are also horns and hoofs, when proved that they have undergone the prescribed purification; but the importation can only take place through the fixed stations, while on other stations such productions are treated as raw materials generally.
6. Wandering masterless dogs are to be shot as soon as they appear on the frontier, while the packages of pedlars are to undergo a strict examination whether they contain skins or other animal products; if such be found, and they happen to come from the infected provinces, they must at once be shown back. Cattle dealers and butchers coming from beyond the frontier, if they cannot prove that they come from sound parts, are likewise not to be admitted, and particular notice on that point is to be given to the communities bordering on the infected places, in the Crown lands.
7. So long as the plague does not prevail on the frontier, when it is not particularly forbidden, the frontier places where the plague has not yet entered, are permitted to have their cattle driven out to the usual pastures, and used within the precinets of the commons for domestic purposes, though not across the frontier. If an inhabitant arrives with a vehicle drawn by cattle from a diseased inland place, he and his vehicle are either to be shown back, or enjoined to keep the same cattle in quarantine, without the town for 10 days, and at the expiration of which to cleanse the cattle and the vehicle before they can be admitted entrance into the place.
8. Frequent excursions are besides to be taken along the frontier, especially in the proximity of the infected frontier-places, to make sure that no by-ways or paths have been attempted to circumvent the bars. Should points to be discovered, which may favour such circumvention, they are to be doubly guarded.

2. Measures for Districts and Localities closely threatened by the Plague.

§ 47.

If, despite these precautionary measures, the plague has made its appearance in one or several places of the Crown lands, the following instructions are to be introduced and carefully watched over, for the safety of the neighbouring places.

1. If the plague has really broken out in a neighbouring place situated within the circle of one hour (one German mile), or even in the next vicinity, the local authorities are at once to announce the fact to the inhabitants, acquaint them with the utter incurability and mortality of the malady, with the consequences of infection, its easy spread, and the great danger threatening the destruction of their whole live stock, and to summons them to the strict observance of the —though troublesome—means of guarding against it. The inhabitants are in particular to be warned against the violation of the regulations, pointing especially to the penalties contained §§ 400–402 of the penal code, which are to be republished.
2. Within the circle of three German miles of the place of the plague, independent of the other penalties, no cattle market is to be held, and all intercourse with the neighbouring infected place prohibited, except on the most urgent necessity under unavoidable circumstances, so long and not until the district authorities announce the total cessation of the plague in the place. No cattle is to pass through the infected place, though the usual roadway lead through it, but it must pass by a road in a different direction purposely appointed for it by the police authorities.

   Intercourse with the infected place, if rendered unavoidable by circumstances, the authorities must strictly see that only horses, and no horned cattle be employed in vehicles of conveyance, nor dogs allowed to accompany them. The cattle stables must not be entered, and in the place where the plague prevails, the remaining in the stables must not last longer than is necessary for the completion of the work.

   At the return home, the shoes and clothes used during the journey must be changed, hands and feet washed, and all approach to the children at home avoided, while the herdsman and farm labourers must be strictly forbidden to enter the locality visited by the plague.
3. It is strictly forbidden, under the penalties of §§. 401 and 402, to the inhabitants of healthy places, to import or purchase secretly or publicly, diseased cattle, meat, milk, butter skins, grease (fat), or any other animal product, whether of sound or sick cattle coming from places suspected of the plague, and to dispose of them to others or to use them for their domestic use, nor is it permitted to any man coming from a place of such disease, to abide long in the healthy locality, and still less to visit the home cattle of the place. A watchful eye must, therefore, be particularly kept on foreign butchers, cattle dealers, and tanners, as also on wandering medicine sellers, public players, and their servants. As soon as they enter the place, they must produce efficient evidence that they came from perfectly unsuspected places, and don't carry with or about them anything subject to infection, but in case they cannot do so, they are to be sent back, either to their homes, or across the frontier.
4. In the communities next to the infected places, the cattle ought possibly be kept in their stables where they are most safe of infection; but should deficiency of fodder necessitate their grazing in the fields, it may be done under the condition that the cattle should not only not enter the ground and soil of the infected locality, but graze at a considerable distance from such a locality, and where it is possible even graze in a contrary direction, or still better, in the fields nearest to their homes. Within the circle of a half a German mile from the infected place, no work is to be done with waggons drawn by draught oxen, and of course, not within the precincts of the infected place itself.

The local authorities are bound, must impress upon all owners of cattle the necessity of laying in a stock of fodder for at least six weeks, that in case the plague should break out in the place, the general seclusion of the stables which will be necessary for the diminution of the malady should not prevent the cattle from being properly fed.

5. All cattle which died in the vicinity during the prevalence of the disease, must be dissected and fully examined by competent judges, and if symptons of the plague show themselves, the place is to be declared as infected, and all the regulations concerning the measures against the disease must be fully carried out.
6. As soon as the plague has broken out in the vicinity of a place, all the afore-named means and measures are to be carried out with redoubled vigour and conscientiousness, and every case of the disease is to be immediately and minutely stated medically.

A few wise and reliable persons are moreover to be chosen from amongst the community, as guards on the frontier and in the place, who are to show back all home and foreign cattle coming from infected places, as also all vehicles driven by oxen, to watch all wandering individuals, together with their luggages, and to stop everything seemingly suspicious.

As *suspicious*, may be considered all persons coming from infected places and leading therefrom cattle, or carrying with them meat, hides, and other animal produce. If refusing to return and step over the frontier by force, one of the guards is to accompany them to the place and give them over to the authorities, who will order the imported cattle to be brought to a separate spot of confinement where they are to be fed at the expense of the owner, while the persons themselves together with the animal products found upon them, are to be conveyed to the next district office where they will be dealt with according to law.

If the confined cattle die within 10 days of the plague, or if it results from investigation, that the imported animal products are parts of secretly slaughtered diseased cattle, the arrested persons are to be punished according to §§ 400–402 of the Penal Code, otherwise they are to be puuished as merely disturbing public order, and released after paying all expenses and loss of their cattle.

3. Measures against the plague, in the place itself, where it has broken out.

(a) Report and preliminary measures.

§ 48.

As soon as the cattle plague has made its appearance in a place, the local authorities are at once to report the fact to the district office, that arrangements may at once be made for the necessary steps to be adopted. But in the infected place itself, the fact is to be announced to the public without waiting for the arrival of the Plague Commission, and to summon all owners of cattle to lock their stables, to give admittance to nobody, and to entrust the nursing of the cattle to only one person, who is bound to keep aloof from all intercourse with the other inhabitants, and more especially with those in whose dwellings the plague has broken out. Any magistrate who neglects to report the fact to the district office or administration is immediately to be dismissed, declared as incapable to fill the office, and is besides to be punished according to §§ 400–402, of the Penal Code.

(b) Medical examination of the plague.

§ 49.

The investigations on the spot are to be introduced by the district judge assisted by the appointed physician or veterinary surgeon of the Plague Commission with all possible haste.

After the arrival of the Commission members, the nature of the prevailing plague is to be ascertained, guided by the questions contained in § 17, and the circumstance whether the disease prevails in the vicinity, and whether droves of foreign cattle have recently passed the place or the vicinity, or whether some fresh cattle have been recently purchased in the place.

(c) Census of live stock.

§ 50.

If previous experience shows the probability, that the malady is not the cattle plague, the members of the Commission can have no hesitation to visit the epidemic stables, and see how matters stand. But if already at the first visit the result shows that the malady is in reality the cattle plague, then an inventory of the number of the existing cattle is to be prepared, the first and important duty of the Commission being, to get a true knowledge of the character of the plague then prevailing in the place, as the only safe means of quickly suppressing the disease consists in the application of the club, whenever it is fully proved that by killing the diseased the others may be saved, and the malady disappear.

The census of live stock is to take place from house to house, regardless of the calculation stated by the committee of the community; but to prevent by this operation it if the further spread of the disease, the Commission must observe the following rules:

1. They have in the first place to visit the stables supposed to be as yet free of the plague, and order all smaller domestic animals to be removed from the courtyards, and confined in a separate place. The doctor or veterinary surgeon is to accompany the member of the Commission in his visit to the stables or to the courtyard where the cattle have been driven in, but without touching them; it is advisable to put before the cattle such fodder as they best like, in order to enable the visitors to judge of their appetite, by the manner in which they seize at the fodder; they have also to inspect the nature of the excrement; if any thing suspicious is apparent, the number of the beasts is to be ascertained and registered.
2. If some of the beasts are suspected of the malady, the house is to be registered, when the closer examination of its cattle will take place after finishing the visits in the stables of the sound animals. As soon as the stable revision is finished throughout the whole place, the suspected beasts are to undergo a medical examination, beginning with the least suspected and finishing with the more suspected. After this the Commission is to repair to the houses already registered as attacked with the plague, and investigate the nature of the disease. If experience (not certainly or probability) suggests the suspicion that the disease is in fact the cattle plague, the examination is to begin—in order to ascertain scientifically the nature of the disease—with the thorough diseased beasts, and above all with a section of the existing cadavers, or a heavily diseased beast that is to be slain for that purpose, which latter process is, by the bye, the best means of ascertaining the nature of the malady.
4. If the result shows that the malady is indeed the cattle plague, the fact is to be published throughout the place, and warning tables to be placarded in all the avenues and streets of the locality. The small domestic animals are then to be removed from the open streets, and the inhabitants are enjoined to the performance, under threat of punishment, while the transit of cattle through the place or the driving with such cattle are to strictly prohibited. Also all the official arrangements necessary for the safety of the neighbouring places are to be immediately introduced, while the census of the live stock, to ascertain the extent and spread of the plague, is not to be undertaken by the Commission on that same day, as it may occasion infection and spread by their presence in the stables and courtyards, but they are to return home, and if the distance is too far, they will have to pass the night in an asylum prepared for the purpose, and proceed the following morning to further operations, after careful cleansing of their clothes.

(d) Extermination of the plague.

a. Where it has not widely spread itself in a locality Slaughtering.

The efficient means of quickly annihilating the plague in a locality are various, according to the greater or lesser spread of the malady at the time of its first appearance. If the result and the recent census of live stock shows that only a few have sickened with the malady in the place whence no further spread abroad is to be apprehended, and that consequently the plague may be expected to cease there by removing quickly the diseased and suspected beasts from the place, and proper cleansing of the stables, then it will be expedient to kill all such beasts, or, as the saying is, *to use the club.*

As suspected beasts, may be regarded all those beasts which have mixed or come in direct or indirect contact with the really diseased ones, even if they show themselves no symptoms of the disease. The application of the *club* is to be applied at every new outbreak of the malady, as the best remedy against the disease. For that purpose it

is necessary that the inhabitants should be compelled, under heavy penalties and severe punishments, to announce without delay the incipient sickening of every beast, and not to wait until the malady has attained a higher degree of danger or until it has attacked a greater number.

The definitive decision whether or not the *club* is to be applied in each case depends on the opinion of the political Commisioner, who with the assistance of one or more veterinary surgeons experienced in such cases, has to decide on its expediency and to report to his superiors.

The *State* is ready to pay for the beasts killed by its orders, under the following conditions:—

a. In doubtful but suspicious cases occurring in suspicious times, when the use of the *club* has been advised by the authentic surgeons and authorities, the owner is entitled to repayment of the value of the beast, as estimated by the surgeon and authorities, after deducting the value of the diseased parts.

b. Compensation for beasts killed after the outbreak of the malady is only then granted when it is satisfactorily proved that no blame is attached to the owner for the sickening of the animal, who has duly followed out the proper regulations concerning the malady, nor even in any way concealed it from the authorities.

To ascertain the value of the killed beasts, the authorities are to be guided by the market price of the locality, by the age, race, and usual employment of the beast, and to keep in sight the interest of the State in awarding the compensation.

As nearly all beasts attacked with the malady never recover, and are thus lost to the owners, even when not killed, regard must be had to the circumstances at the valuation of the price to be compensated, by which the authorities are to be guided by the following rules:—

1. Cattle attacked by the plague at so advanced state that they could not be expected to survive it, the compensation is to be one-third.
2. For cattle killed at the beginning of the illness, and the severity or degree of the malady remains, doubtful, the compensation is to be two-thirds.

The hides and horns of the killed animals may, after their due cleansing, and the fat, after its being melted over fire, be eventually sold, and their value is therefore to be deducted from the total sum of their estimated value.

If beasts doomed to be destroyed were in such a state as to leave a doubt whether they were entirely sound, or attacked by the first symptoms of the plague, they are to be professionally slaughtered, and inspected by the Commission. If their entrails show no traces of the malady, the flesh may be given up to the owner for home consumption, and the value is to be deducted from the total estimate. But if several beasts are to be slaughtered in one and the same house, and it is evident that they exceed the necessary consumption of the household, the flesh may be sold to the local butchers, or if such is not feasible in the place, it may be smoked or pickled, or sent for disposal in a neighbouring large town. The transport, however, of such meat to towns can, with the exception of the entrails, be effected either by carriage, or, according to circumstances, by rail, under surveillance of a reliable escort, who will be entrusted by the Commission with the necessary certificates, and a letter to the inspector of the market, who is to dispose of the meat at the best price for account of the Treasury.

Sound cattle who are to be killed merely for having come in contact with sick cattle, may be sold to butchers, who are, however, bound to slaughter them in the *plague house*, and have them inspected by reliable individuals. But if no butcher is found in the place willing to purchase them, they may be dispatched, if a railway is in the vicinity, by rail direct, and under escort, to a larger town, (in Austria, *Vienna*,) where the consumption of meat is more considerable; but the quantity must be accompanied by a certificate from one of the Commissioners, wherein is indicated the number of the pieces, the age and race of the cattle, and the name of the owner, and equally accompanied by a letter to the inspector of the market, &c. &c., as is mentioned in the foregoing paragraph.

A similar proceeding may be managed, if the place be situated near a navigable river, and where the apparently as yet sound meat may be dispatched upon this way (without deviating from the proper course) to a large town. But if no railway exists in the neighbourhood, the seemingly sound beasts are to be slaughtered in the plague house, and the carcases disposed off, as mentioned above.

The usual compensation is granted as above, even to owners who have been guilty of violation of the plague regulations, and were even condemned to penalties and loss of goods.

β. Proceeding where the plague is extensively spread.

§ 52.

If the investigation shows that the plague has already reached a greater extent, and that numerous beasts diseased or suspected of the disease exist in various farms, or that numerous cases of the plague have been kept secret, or that healthy beasts had been allowed to mix with the diseased ones, so that the killing of both categories would be useless, as the cost of their destruction would hardly be in proportion to their value, or in any way be the means of checking the further spread of the disease: in such a case the Commissioners must think of other steps how to remedy the evil.

These consist in the establishing two sorts of quarantine asylums, according to § 23, one for the real infected beasts, and another for the merely suspected ones; while both divisions are to have separate attendants, who are not to come in contact with any individual of the community. The necessary provender for the cattle, and their drinking water, as also the food for the attendants themselves, must be brought by some appointed porters to spots some distance off these asylums, where they are to deposit them and soon remove from these spots, when they are taken up by the attendants. If there are in an infected farm numerous heads of cattle, they are to be parcelled into 5 or 10 heads, and each division strictly separated from the other, so that every one of such divisions is to have its own attendant, who is not to come into contact with any of the other divisions. Where such remote separate stablings are impossible, the divisions may be brought under separate groves or fenced places. The use of such divisions consists in the circumstance that the infection cannot be imparted to the other divisions though the plague has broken out in one of them. Should any one beast be attacked with the disease, it must at once be transported to the plague stable, while the division is to be kept in utter seclusion for 10 days, when if will appear if any other beast is similarly attacked. Should, however, local circumstances render these measures impracticable, the diseased cattle are to be left in their stables, while the merely suspected ones are to be carried elsewhere, such as horse or sheep stables, which localities are to be kept under strict seclusion; these measures do not, however, warrant the rapid extinction of the plague, nor its spread elsewhere, or the immediate cleansing of the infected localities. If a place where the plague has already made vast progress is situated near a railway, and not too remote from a large town, great loss of property may be obviated by dispatching the merely inspected or sound cattle at once to that town, and dispose of them (after they are slaughtered) as indicated in § 51.

Further measures against the plague prevalent in a place.

§ 53.

As soon as it is a known fact that the plague has broken out in a place, other measures, independent of those of slaying the cattle or putting them in quarantine asylums, are likewise immediately to be taken.

1. The outbreak is without delay to be notified to the neighbouring communities, and request them to follow out the directions in § 47.
2. The inhabitants or the infected place itself are to be instructed on the nature of the malady and its contagious powers, as also on the manner how to preserve their cattle from infection, and to publish for their instruction the often-repeated penalties contained in § 400—402.
3. The infected place is to be closely secluded, while in its avenues and streets are to be placarded tables, in which is to be written legibly in the vernacular tongue the sad news of the appearance of the plague. Also every house in which the plague has broken out is to be marked by some stricking sign, as a house where the plague is raging, while all intercourse of its inmates with those of healthy localities is to be prevented even by means of the military and gensd'armes, so long and until the cleansing of the infected stables, implements, and clothes of the inmates has been accomplished.

   The intercouse of the inhabitants with the neighbourhood, the visits to the neighbouring churches, schools, and pleasure resorts, and even the carrying of grain to the neighbouring mills, must for the present be interrupted.
4. All vehicles in the place and its vicinity can only be driven by horses, while the horned cattle must remain confined in their stables, until the plague has entirely ceased, and the permission of intercourse is officially notified. The doors of the stables are to be so closely locked that neither dogs, cats, nor fowls shall be able to slip through. Dogs found running about in the streets are to be caught, confined and

chained, or killed, because these animals may easily introduce the plague elsewhere.

5. The entrances leading to the place are to be guarded by reliable watchmen or military, who have to see that neither cattle nor their products are to enter or exit, as also to refuse entrance to individuals who deal with such products.
6. The holding of cattle fairs in the place itself or in its environs (within a circle of three German miles), as also the buying and selling of horned cattle, the sale of meat, milk, &c., as also the emigration of the inhabitants together with their cattle, are prohibited so long as the plague lasts.
7. The removal and interment of the cadavres are to be effected according to § 28; with regard to the handling of the skins, horns, hoofs, and bones, rules are given in § 29.
8. Every empty stable infected by the diseased cattle is to be immediately and carefully cleansed, according to the prescriptions contained in §§ 30 and 31. As the fate of the future cattle, and in short of the whole stock of the community, chiefly depends on this manner of disinfection, it is to be confided not to the inhabitants themselves, but to particular confidential persons who do not possess any horned cattle, and who will do the work under inspection of the police or gensd'armes, and by means of horses employed for that purpose.
9. To meet the crimes of concealment of the sick cattle or secret removal of suspicious parts, a revision is requisite of the existing stock of cattle, keeping in mind all the afore-named safety measures to prevent the acting officers themselves from carrying the infection elsewhere.
10. The Commission is empowered to enforce obedience to the prescribed regulations by all means possible, even by calling to their assistance the military, and to report to the superior tribunal their judgments, sentencing the disobedient either to imprisonment (not exceeding 3 days) or to a fine (not exceeding 50 florins =£5).
11. Should the plague break out in the stable of a large town where horned cattle are only kept for the sake of dairy milk, and where no pastures exist, it is sufficient to close and seclude the dairy, and insisting upon the immediate sale to butchers of the cattle suspected of the malady.
12. If the plague breaks out amongst a herd which are only kept upon pasturing fields or commons, the prescribed regulations are to be modified according to circumstances, but strictly insisting upon the separation of the diseased from the apparently sound beasts, and prevent the former from mixing with other cattle.
13. A medical treatment of the cattle plague can only be allowed in places where the plague has so increased in magnitude as to render the application of the *club* of no avail, and under circumstances which necessitate the establishment of quarantine.

    So long, however, as there is hope that the plague may quickly cease by the measures indicated in § 51, all other attempts at remedial cures are strictly prohibited, as they may be the very occasion for introducing the malady elsewhere, or to prolong its existence, and increase the losses already incurred; but in places where such attempts have been of notorious efficacy and success, the veterinary surgeon is allowed to make his experiments, but only on the diseased beasts alone, and dare not come in contact with either the inhabitants or the sound and merely suspected animals.
14. The plague may only then be declared to have ceased in a place, when all the conditions enumerated in § 38 have been fulfilled, and more especially when the cleansing of the stables and implements have been completely accomplished, the refuse and animal produce duly treated, the final revision undertaken, and the term of 21 days after the last case of recovery or death had expired without a renewal of the malady in the interim.

Division of the infected Country into Plague Districts.

§ 54.

If the plague is spread over an extensive district it is to be subdivided into smaller circles, to facilitate inspection, and to appoint in each a Commission according to § 11 and 53, sub. 10. Should there not be a sufficient number of official veterinary surgeons in the place to carry out the medical regulations, a report to that effect must in every case be sent by the local authorities to the provincial tribunals, that a military staff of surgeons may be called to the assistance. The Commission is bound—

(*a.*) To become acquainted with the exact number of the cattle stock in the circle.
(*b.*) To order the requisite official regulations.
(*c.*) To appoint in every locality in the vicinity a veterinary surgeon, and a gend'arme or policeman to watch over and enforce the execution of the measures.
(*d.*) To impress the mind of both with the necessity of doing their duties detailed to them by the Commission.

Inoculation.

§ 55.

The vaccination of the plague with consent of the provincial authorities can only then take place in localities where the plague has already extensively spread among the cattle, and where, in consequence of the numerous points of contact, there is reason to believe that the greatest part of the stock must inevitably and gradually fall a victim to the disease.

Such vaccination is only permissible for the purpose of shortening the duration of the plague, and of possibly allowing the burdensome seclusion of the place to be abolished quickly; but it is prohibited to practise it in places where the plague has just broken out, and where it may be hoped that the official measures will be of use to limit its spread, and effect a perfect cessation of the disease.

It is understood that wherever the veccination is allowed, no modification of the measures already named above can take place.

PRUSSIA.

Translation of Instructions issued by the Provincial Administration of Breslau in 1856, and communicated by the Prussian Government to the Authorities of other Provinces of the Kingdom.*

(*Extracted from Horn's "Preussische Veterinär-Medicinal-Wesen" transmitted by Lord Napier. Translation furnished by the Foreign Office.*)

The Cattle Plague, which has broken out in our Department, once more requires us to call attention to the punctual adoption of the directions contained in the "Patent on the Diseases of cattle" of the 2d April 1803, and in the rescript of the Home Office of the 8th November 1813, which follow here in abstract.

1. *Duty of giving Notice.*

§ 1. In the whole of the department every cattle owner is bound to give notice of every suspected attack of disease.

It is especially considered to be suspicious if at any place two beasts die within 14 days out of a stock of about 50 head or three or more out of a larger stock.

§ 2. Within a circle of two German miles around infected places every cattle owner must also give notice of the smallest trace of sickness in his stock.

§ 3. The duty of giving notice is not limited to the owner, but is incumbent on every one, particularly on cattle doctors, herdsmen, and skinners.

2. *Inspector of Sound Cattle.*

§ 4. In every place attacked by the malady one inspector of sound cattle (and more in case of necessity) shall be forthwith appointed.

He shall be bound—

(*a*) to inspect every day all stables not yet attacked;
(*b*) to take care that every beast in any way sick shall be separated;
(*c*) to be present at slaughtering every beast in order to cause any that may be suspicious to be carried away and buried forthwith.

3. *Separation.*

§ 5. Every beast perceived to be in any way suspiciously sick shall be forthwith isolated.

The best way, as a rule, of doing this is to remove the sound cattle from the infected stable, and to dispose of them in other places.

These compartments are to be made as small as space and opportunity in any way permit.

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* The Prussian Regulations on this subject are very strict and minute. They date from the year 1803. These Instructions have been selected as containing a concise summary of them.

§ 6. The infected stable shall be at once shut up, and shall so remain after the removal of the sick beast, which is to be effected as speedily as possible, until it be disinfected in accordance with directions.

The closing shall be effected by a lock, the key to which shall be kept by the inspector of sick cattle. Moreover, the stable shall be officially sealed by means of a strip of linen.

§ 7. While the malady lasts every beast in infected places shall remain in the stables, and may not be used in any way for draught or field work.

4. *Removal of Sick Cattle.*

§ 8. Every beast in anyway suspiciously sick shall be forthwith carried away alive to the first quarantine stable.

This is to be done by an appointed cattle conductor.

The removal shall take place through paths which are not trodden by other cattle.

§ 9. If the sick beast, by reason of too far advanced weakness, is unable to walk by the road it shall be killed on the premises, and shall be treated as a beast that has died.

5. *Slaughtering of Sick Cattle.*

§ 10.—

(*a*) Every beast sick of the plague shall be killed here without ceremony, and buried according to directions.

(*b*) Every suspected beast shall likewise be slaughtered.

If the existence of the plague be once certainly shown, it is better that perhaps once or so a beast sick of another malady should be killed as suspected of plague than that too much minuteness should be used in examinations.

(*c*) If the plague breaks out first in a district upon a solitary establishment where the stock is not above ten, the whole shall be killed even though they should be sound.

(*d*) In the same way, the two beasts shall be killed which stood on each side of any sick beast, although they might appear to be sound.

(*e*) If a fresh outbreak should take place in one of the small compartments in which all the sound cattle of the establishment were shut up after the infection of the stable the whole compartment shall be killed.

It is especially of the utmost importance and is most sure to contribute to the prompt extinction of the plague that every beast attacked at the very commencement of the malady be forthwith killed and put away without taking too much trouble in examination in the quarantine stables.

6. *Burial.*

§ 11. The slaughtered cattle shall be at once buried in the burying-ground.

The same shall be done with those which die in the place.

The burying-place is to be made not too far from the establishments, upon a spot as solitary and desert as possible.

§ 12. The graves must be from six to eight feet in depth.

§ 13. All flaying or secret burying is forbidden.

The hide must previously be cut through sufficiently (ausreichend) and the carcass covered over with unslacked lime.

7. *Slaughterers.*

§ 14. A competent man shall be appointed—

(*a*) for slaughtering the cattle;

(*b*) for carrying away the dead by means of a cart or sledge drawn by horses;

(*c*) for digging the graves, and burying.

8. *Quarantine Stables.*

§ 15. In order to decide in doubtful cases of sickness, the cattle may be submitted to an observation, which shall not, however, extend beyond 48 hours.

Any beast that shall appear to be sick after this interval, shall be at once killed, to be decided by the inspector of the sick beast.

The observation to be made in the first quarantine stable, which, as a rule, is to be established for three to four head immediately after the outbreak of the malady, and in the neighbourhood of the burying place.

If a beast is admitted to be sound after 48 hours' quarantine, it shall be brought to the second quarantine stable, which can hold five to six head, and shall be left there until its release be ordered by the authorities. The stables may be put up slightly with planks; they shall be placed at a suitable distance from each other, and must be closed by the necessary attendants.

9. *Shutting-up.*

§ 16. In addition to the special closing of the infected and quarantine stables, there shall be, according to circumstances, a closing of the yards and hamlets (ortschafte);

(*a*) Closure of infected premises shall take place, except in harvest time, always and everywhere, and shall begin at once, if a suspicious malady shows itself. It shall apply to men, cattle, and things. The only exceptions are the persons employed in extirpating the malady, as also the clergy, medical men, and midwives, if their presence be required on the premises.

(*b*) Closure of hamlets may be either absolute or relative, according to circumstances.

Absolute closure shall always take place when three establishments are attacked in hamlets where there are less than 20 cattle owners. The same shall take place when four are attacked in the case of 20 to 30 cattle establishments, and when five in case of a greater number.

Only large cities or trading towns are closed relatively.

Absolute closure includes the whole territory (feldmark) with the quarantine stables and burying-place. It is for men, as well as cattle and things, and must be as perfect as if the place in question were shut out from the land; all passage through the closed place ceases. Roads and posts are to be stopped.

Relative closure takes place in all other cases; it consists in guarding the place with the object of preventing either cattle or things capable of infection, or men from coming out, who may have had any communication with cattle.

Men who have had no communication with the cattle must prove this by the attestation of the appointed inspector.

§ 17. The closure is effected by trustworthy watchmen, who themselves must have no intercourse whatever with the closed localities, or with what is in them.

In any given case of necessity, military aid is to be required of the Government for securing closure.

§ 18. All necessary provisions, fodder for cattle, clothes, &c. to be supplied to the enclosed inhabitants, guards, &c., must be laid down by the guards at a distance of at least 100 paces from the closed localities, and after their departure must be fetched by the enclosed persons.

§ 19. The surrounding hamlets also must be defended by an appointed watch from the forbidden entrance of cattle, of things liable to infection, and of men.

10. *Further Limitations of Intercourse.*

§ 20. All communications between sick and sound cattle, between men and things, which have come in contact with the same is prohibited. This holds good as well for communication inside as out of the place. Likewise especially for all watchmen and inspectors, as well as for all persons who deal with cattle, meat, tallow, hides, horns, hair, &c.

§ 21. All cattle markets are stopped in infected places, and within three German miles from the same.

§ 22. Likewise all retail, wool, and weekly markets in infected places.

§ 25. All trade in cattle and rauchfutter (?) from the infected place to the outside is unconditionally prohibited.

§ 24. All trade in cattle and rauchfutter (?) must, as a a rule, cease, both in the infected place, and in the neighbourhood, within three German miles. Such trade may, exceptionally take place among the non-infected farms of the hamlet, under the strict control of the police authorities, but only for the necessary supply of the farms, and with such necessity attested; as also for slaughtering. And the same shall hold good among the farms within a radius of three German miles.

§ 25. This limitation of cattle trade and business shall continue for two months after the cessation of the malady, and trade in cattle cannot be carried on without the permission of the district authorities for the two months following.

It is of course understood that the resumption of the empty forms also is not to take place before the lapse of this period.

§ 26. The fodder placed over the stables of the sick is to be used solely by horses and sheep.

§ 27. In infected places, and in the country, three German miles round, all dogs are to be kept chained, and all cats and poultry shut up.

11. *Cleanliness.*

§ 28. Servants may not leave their service without complete and attested disinfection, when the farm is infected in which they have been serving.

§ 29.—

(*a*) If the sound cattle cannot, for want of opportunity, be removed from the infected stable, the dung

must be taken away twice a-day and buried two feet deep in the garden, or behind the farm.

This holds good likewise for the quarantine stables.

(*b*) And the dung must be taken away twice a week from the stables not infected.

(*c*) Dung, blood, slime, &c. coming from a sick beast, especially while it is on the way to the quarantine stable, must be buried.

(*d*) All fluids coming from an infected stable from the first appearance of the malady must be conducted to a special cesspool of sufficient depth.

(*e*) Men who have necessarily to do with diseased cattle must clean their persons, change their clothes, and keep themselves from any communication with diseased (? sound) cattle and their owners.

12. *Duration of Arrangements.*

§ 30. All the above directed arrangements are to be continued for four weeks after the last death of a diseased beast, except in the case where a longer term has been prescribed.

13. *Disinfection.*

§ 31. See the Annexe.

14. *Control of the Arrangements.*

§ 32. In addition to the above-mentioned inspector of sound cattle, conductor of sick cattle, attendants and slaughterers of the same, a superintendent shall also be appointed for the sick cattle, whose chief duty shall be to order and carry out every measure which may be rendered necessary on account of contact with the diseased cattle; that is to say, he must twice every day look over the farms where the malady has shown itself; attend to fresh notices of disease; look after the insulation, removal, slaughtering, and burying; attend to confining, disinfecting, &c.; and give an account of everything.

§ 33. The Inspector of the place who shall be appointed must first of all examine everything, keep a diary, and make his report. The police authority of the place may make the appointment.

§ 34. All these persons must be furnished with special directions by the authorities, and be sworn to carry them into execution.

§ 35. The chief direction, with the aid of the doctor and veterinary surgeon of the district, if necessary, is in the hands of the Landrath, who will give notice forthwith to the Government of every fresh outbreak—of its evidence, its extent, and of the measures actually employed.

In 14 days at furthest, and if the malady is especially violent, at least every 8 days, a further report must be made to the Government upon the course of the malady, the number of cattle attacked, died, and slaughtered; the measures taken, any hindrances, &c.

The exciting mode of treatment customary elsewhere is unsuitable in the Cattle Plague, and in any case of lassitude must be met by severe penalties.

15. *Prohibition of Medical Treatment.*

§ 36. All medical treatment of diseased cattle is strictly forbidden.

§ 37. The same holds good for recommending and publicly advertising remedies.

16. *Penalties.*

§ 38. The penalties pronounced in the "Patent" for offences against the legal prescripts are very severe, and frequently mount to several years' confinement in the house of correction.

Every one should make himself acquainted therewith, and act strictly in accordance thereto.

17. *Publication.*

§ 39. But this extract is to be posted up in infected places, and in places within three German miles of circuit, at public houses, and at church doors; likewise copies are to be given to all persons who are interested therein.

Information upon the indications of Cattle Plague in the living and dead beast, as also a specification of the precautionary measures requisite to protect cattle from infection is contained in our official paper of this year (No. 24. Extraordinary Supplement).

Breslau, 16th June 1856.

Royal Government Home Department.

Annexe.

Process of Disinfection in the Cattle Plague.

General Rules.

§ 1. The disinfection applies to everything which may in any way have been in communication with the contagious matter of the Cattle Plague; persons, articles of clothing, stables, farmyards, places of burial, and quarantine, furniture and vessels.

§ 2. The disinfection of persons, their dress, things, &c. is effected, not only at the termination of the malady, but as often as possible while it is going on.

§ 3. The disinfection of localities which have been kept closed until then should not be commenced until fourteen days after the last case of sickness, if any sound cattle remain on the premises.

But the interval may be reduced to eight days when the place and the opportunity allow of such arrangements that the cattle thereon are perfectly secure.

But a powerful chlorine fumigation should be made as a preliminary in the infected stable as soon as it is empty.

§ 4. It is best that everything of no especial value should be entirely destroyed, and it is much to be recommended, that people should not be sparing about this. The destruction should, according to circumstances, be effected by burning or by burying very deep.

§ 5. A small disinfection room should always be established near the infected localities, in which the requisite chlorine fumigation should be applied.

§ 6. An especial disinfector should be everywhere appointed, who should be immediately responsible for the execution and completeness of the disinfection.

For this purpose it is best to take a veterinary surgeon or sanitary attendant (Heildiener) or inspector of diseased cattle.

§ 7. Whenever a disinfection is completely finished, a written report is to be prepared by the disinfector, and always to be laid before us for inspection.

II. Process of Disinfection.

1. *For Persons.*

§ 8. Persons must—

(*a*) Be exposed to a moderate fumigation with chlorine gas for 10 minutes.

(*b*) Change their clothing.

(*c*) Wash their persons thoroughly with soap.

2. *For Clothing.*

§ 9.—

(*a*) All their clothes must first of all be exposed to the action of chlorine.

(*b*) Everything washable shall be put into lie (*sic*) and washed with the same. This includes all tissues of linen and wool.

(*c*) All woollen stuff, skin, &c., will then be exposed to a stronger chlorine fumigation, and after that to a high temperature; they must then be hung up on poles separately and aired eight days at least.

(*d*) Shoes and boots, also sticks, demand very especial attention, because dung and muck, the most usual carriers of the matter of contagion, stick to them.

They must, therefore, if they are preserved, be washed in strong lie, with particular care, and exposed to strong chlorine fumigation for 24 hours.

3. *The Stables.*

§ 10.—

(*a*) If dung or other dirt remain in the infected stables, the same must forthwith be buried two feet deep in a remote place.

(*b*) The floor is to be taken up. If it be of wood, it must be burnt, if of stones, they must be washed, and allowed to remain four weeks in the open air.

(*c*) The earth must be dug out to the depth of two feet, and the same as is prescribed for the dung, must be done with it.

(*d*) Cribs and racks of wood, any loose planks, and such like valueless objects, such as the vessels used by the sick cattle (drinking and milk vessels), bits of furniture, rope, &c., must be burnt.

(*e*) All other things such as wood-work in the stables (posts, beams, windows, &c.) which cannot be burnt must be washed with strong lie, and exposed for 14 days to the passage of the open air.

(*f*) Stone walls must also be washed, plastered walls must be scraped deeply, and covered anew with clay and lime.

(*g*) Lastly an energetic fumigation with chlorine must be again employed for 24 hours, and then the empty stable must be exposed to the free-passage of the air, until the expiration of the term fixed by law.

(*h*) The quarantine stables should, as a rule, be burnt on the spot.

If there be still dung or other muck in other stables, or in the dung-pit of the infected farm, it shall be forthwith carried by horses to the field and ploughed in, or if this be not possible for the moment, it should be scattered about

A workman must walk behind the waggon, and immediately shovel in again anything that may fall out.

The horse and the labourers must not communicate with the cattle. The latter must be disinfected when their work is done; the former must be watered (geschwemmt).

No cattle must go into the field for four weeks.

4. *The Implements.*

§ 11. The carts (sledge, waggon) upon which a dead or slaughtered beast has been carried to the burying place must be burnt, together with the harness used.

Dung carts according to rule are served in the same way, and it is therefore proper to employ the same carts in carrying away the dung.

When this is not done, and the waggon employed is to be preserved it must be washed with hot lie under particular precaution, and for a long time be exposed to the open air.

A very especial attention is to be given to dung-forks and mattocks, and they must be made red hot.

5. *The Cesspools.*

§ 12. Any cesspools made upon the farm must be filled up with earth and covered in with stones.

6. *Burying Places.*

§ 13. Burying and qrarantine places must be surrounded with hedge and ditch and overlaid with a pavement of stone, which must remain for two years.

III. Preparation of Chlorine.

§ 14. The simplest and easiest way of procuring chlorine, is to pour four loths (about two oz.) of diluted sulphuric acid upon the same quantity of muriate of lime (chloride of calcium) in an earthenware saucer.

Such a saucer will be sufficient for the disinfection of about 100 cubic feet of space.

Still cheaper is the so-called chlorine-fumigation of Guyton Morveau. To prepare this, a mixture must be made of two parts brimstone and three parts common salt (muriate of soda) and an equal quantity of diluted sulphuric acid must in like manner be poured upon it.

See the precautionary rules to be attended to in the chlorine fumigations in our directions in the process of disinfection of sanitary attendants which are distributed everywhere.

LONDON:
Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.
For Her Majesty's Stationery Office.

SECOND REPORT

OF

THE COMMISSIONERS

APPOINTED TO INQUIRE

INTO

THE ORIGIN AND NATURE, &c.

OF

THE CATTLE PLAGUE;

WITH THE

MINUTES OF EVIDENCE AND AN APPENDIX.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1866.

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SECOND REPORT

OF

The COMMISSIONERS appointed to inquire into the ORIGIN and NATURE, &c. of the CATTLE PLAGUE.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

SINCE our First Report was submitted to Your Majesty, the disease has continued to spread, the ratio of its advance fluctuating much in different places, but presenting something like uniformity on the whole. The total number of reported cases from the commencement was—

Oct. 7 - - - -	11,300
Nov. 4 - - - -	20,897
Dec. 2 - - - -	39,714
Dec. 30 - - - -	73,549
Jan. 27 - - - -	120,740*

It has thus nearly doubled itself at intervals of four weeks.

These figures, however, formidable as they are, by no means represent the real amount of loss and suffering inflicted by a calamity which ravages some districts while it spares others. A pressure, which would be less if distributed over a large area, is ruinous and crushing when those on whom it rests are comparatively few. Cheshire, for instance, which depends in great measure upon its dairy stock, has had, up to the 27th January, 17,971 cases of disease, Forfarshire 10,099, Lanarkshire 4,371, Cambridgeshire 4,364, Lincolnshire 4,080, Norfolk 4,063, Yorkshire 19,331 ; and the records of particular villages and farms where the disease has raged would tell a still more distressing tale.

The great breeding districts of the United Kingdom, into which in ordinary times cattle are but rarely and casually imported—Ireland, the North and West Highlands of Scotland, including the counties of Argyle, Ross, and Sutherland, and the whole of Wales except Denbighshire and Flintshire—have hitherto enjoyed an entire immunity. The disease has for the most part established itself, by direct importation from London or from Holland, at various centres on the eastern side of the island, and thence has travelled towards the west or south-west, traversing alike low and elevated lands, and not apparently influenced by varieties of soil. It has moved irregularly, leaping not unfrequently from one point to another at a considerable distance, but seems generally to have followed the course of highways and ordinary lines of cattle traffic. A careful observer,† who has attentively watched its progress through his own district, states that, whilst it often passes one stock and attacks another at a greater distance from a centre, it invariably returns as it came to the one passed. "This passing," he says, "is only apparent : it is owing to one stock being more predisposed to the disease than the other ; that is, the one attacked has less power of resistance to the poison than the one that apparently escaped it." The means by which it has transported itself to new centres can in a great number of instances be traced with certainty, but they often elude detection.

In the contagiousness and the mortality of the disease there has been no abatement, as the subjoined tables, compiled from the weekly returns published by the Veterinary Department of the Privy Council Office, will shew.

* These returns do not profess to give the total number of cases which have occurred in Great Britain, but only those which have been ascertained from the official information received from Inspectors.

† Dr. Moffat, of Hawarden, Flintshire.

Of the total number of cattle on farms, in sheds or other places, where the disease has been officially reported to exist (after deducting those slaughtered healthy), there were *attacked* in every 100 :—*

Up to November	4	- -	44
„ „	11	- -	43
„ „	18	- -	44
„ „	25	- -	44
„ December	2	- -	44
„ „	9	- -	50
„ „	16	- -	51
Up to December	23	- -	51
„ „	30	- -	51
„ January	6	- -	51
„ „	13	- -	52
„ „	20	- -	53
„ „	27	- -	54

Of the total number of cattle known to have been *attacked* by the disease, there were in every 100 :—†

	Killed.	Died.	Recovered.	Unaccounted for.
Up to November 4 -	36	43	5	15
„ 11 -	34	44	5	15
„ 18 -	32	46	6	14
„ 25 -	29	48	7	15
Up to December 2 -	27	50	7	15
„ 9 -	24	51	7	15
„ 16 -	22	53	8	15
„ 23 -	20	54	9	15
„ 30 -	18	56	9	15
Up to January 6 -	17	57	10	14
„ 13 -	16	58	10	14
„ 20 -	15	59	11	14
„ 27 -	13	61	11	13

Taking actual numbers instead of per-centages, there were, out of the 120,740 cases of disease reported up to the 27th January—

Killed diseased.	Died.	Recovered.	Unaccounted for.
16,742	73,750	14,162	16,086

From the above figures it will have been observed that as the number of diseased animals *killed* has diminished, the per-centage of *attacks* among the animals exposed to infection has increased, whilst the per-centage of *deaths from disease* among the animals attacked has risen still more steadily, and in a greater proportion. Were slaughtering entirely abandoned, the recoveries would probably not exceed fifteen per cent.

All breeds of cattle appear to be subject to the disease; but the more highly bred the animal, the sooner, generally speaking, it succumbs. English stock, compared with foreign breeds, seem to have less power of resistance. Of the Dutch it has been observed in this country, that although not perhaps less liable to be attacked than other varieties, they survive the first attack longer, and more of them recover. Animals in good condition, says another observer, resist the longest; but, if they become diseased, the disease runs its course in them more rapidly.

Of the influences of weather and temperature nothing definite can be said. The long drought of the summer has been followed by copious and almost incessant rains, with continued south-westerly gales. The disease increased in intensity with the advance of winter, and it has travelled commonly in a direction counter to that of the prevailing winds. It is proper to add that the year has been peculiarly favourable to the spread of zymotic diseases generally, and to the rapid decomposition of organic matter.

We have endeavoured, but without success, to obtain specific information as to the introduction of the disease into this country. Inquiry has been made, with this object, of the several persons through whose hands the cargo of bullocks imported from Revel in May passed after their arrival at Hull. This cargo, it will be remembered, was divided, on landing, into two portions: part were disposed of through salesmen in different towns in the North of England, and the rest sent to London and sold to butchers in small lots, a lot of twenty being bought and sent to Gosport by a Government contractor. Questions have been addressed to all these persons, and from their answers we have no reason to doubt that all the animals were bought and slaughtered, so far as

* Decimals are omitted.
† Decimals are omitted. The sum of the figures, therefore, in each horizontal line will not be exactly 100.

the purchasers could judge, in a perfectly healthy state. With respect to the diffusion of the disease in the Russian Empire itself (setting aside the steppe provinces in Europe and Asia), we have no satisfactory evidence. In the Baltic provinces it does not seem to have shown itself last year. There were many scattered outbreaks (which indeed are frequent) in Central and Western Russia; and it raged with considerable violence between January and May in the Government of Kowno, which is very near to the port of Memel,* and between January and July in that of Volhynia, which borders on the Gallician frontier, and from whence cattle may be easily driven to the eastern terminus of the Vienna and Lemberg Railway. A subsequent outbreak occurred in Kowno in November, and led to the immediate enforcement by the Prussian authorities of the stringent regulations which the law of Prussia orders to be applied to the frontier of an infected district. The theory that the disease originated in the London cow-sheds is inconsistent, not only with the evidence appended to our First Report, but with that which we have since received. The careful observations made by Dr. Ballard, Medical Officer of Health for St. Mary's, Islington, confirmed by those of the Medical Officers for Marylebone and St. Pancras, and the experience of other metropolitan districts, are in direct conflict with this theory, and point distinctly to contagion as the means by which the Plague was originated and propagated in London.

II.

We adverted in our First Report to the outbreak of the plague in Holland. Weekly returns of its progress in the Province of South Holland, to which until recently it was practically confined by strict measures of police strengthened by a military and naval cordon, have been published by the Dutch Government, in a form closely resembling those issued here by the Veterinary Department of the Privy Council. From these returns it appears that the total number of cases, which was 4,084 on the 7th October and 6,744 on the 4th November (the attacks having diminished in the intervening weeks), rose by the 2d December to 11,348, and by the 30th December to 21,437, nearly doubling itself in each month. The increase is attributed to the removal of the cattle from the pastures to their stalls, the close contact causing the infection to run its course more rapidly. During the last three weeks there has again been a gradual decrease. "In one respect, however," says Mr. Ward, Secretary to Your Majesty's Legation at the Hague, in his Report on this subject, dated 10th January 1866, "the "last return presents an unfavourable appearance. Out of seven places in which the "breaking out of the Plague is reported for the first time, it is stated that the origin of "it cannot be traced to any contagious medium, contrary to the opinion of high "authorities upon the subject, that every case would be found so traceable. Again, "though in the original focus of the disease a diminution is announced for the first time "since the commencement of it, yet in other cases where it has long raged it has "assumed a more aggravated character. The area over which it has spread is also "increasing. Returns have been made for the Province of Utrecht, in which a few "isolated cases in the early part of the season had been followed by an entire cessation "of the scourge, shewing, for the week ending December 30, 349 new cases, 165 deaths, "2 slaughtered, and 146 recovered; making a total of 1,104 cases, 394 deaths, 27 "slaughtered, 316 recovered, and 367 still under treatment. The Provinces of North "Brabant and North Holland have also been invaded, according to the latest accounts, "though no official returns of the extent of the visitation have yet been made." The rate of mortality in Holland, we must add, is considerably lower, as Mr. Ward observes, than in this country. The latest Returns issued since the date of his Report show that out of 29,031 cases, the total number in South Holland, 7,410 were slaughtered, 8,966 died, and 9,896 (or about 34 per cent.) recovered; and these proportions have not very materially varied since the commencement; whilst in Utrecht, where the number slaughtered has been inconsiderable, there have been 926 recoveries to 790 deaths. The Dutch Government appears to have placed its chief reliance on the maintenance of the cordon drawn around the most infected Province, which permits no egress, nor, except under most stringent restrictions,† any ingress of cattle. A further exception, however,

* No cattle, however, were imported into the United Kingdom in 1865 from any Prussian port.

† Under an order in the *Nederlandsche Staats Courant* for 30th November 1865, no animal is to be introduced without (1) evident need, (2) a licence granted by the burgomaster of the place of destination, and (3) *visé* by the burgomaster of the place of despatch, who must have satisfied himself by (4) a declaration of some competent person (*bevoegd deskundige*) that the beast is sound and from an uninfected place; and the licence must also be (5) approved by the Royal Commissary for South Holland. The animal must (6) be accompanied by a person appointed by the burgomaster, and (7) given in charge, on arrival, to one or more appointed persons, and (8) slaughtered within a short fixed period.

is made in favour of through traffic, and the Dutch-Rhenish Railway, which conveys weekly large quantities of cattle for exportation to England, passes through the heart of the enclosed district. The enforcement of other internal regulations has been left to the local authorities, except that the Government has interfered to close markets where the authorities of the commune had refused to do this. Some difficulty seems also to have been experienced in inducing the people to submit to restraint. We are told that "in "the Province of Utrecht the action of the authorities is resisted by force, and has to be "supported by military detachments. There are cases in which the troops are beaten off "by large bands of peasants, and have to take the cow-sheds by regular siege.*"

The Cattle Plague in Belgium has been made the subject of a careful and interesting Report by Mr. Barron, your Majesty's Secretary of Legation at Brussels. The energetic measures adopted by the Belgian Government have been completely successful. The total number of cases in that country has not exceeded 306, of which 17 died and all the rest were slaughtered. "The localities," says Mr. Barron, "where it was at first mistaken "or concealed are those which have had to struggle the longest to dislodge it. On one "farm at Leffinghe the whole herd of 40 were killed between November 23d and "December 8th. Three weeks after, on December 30th, the same disease broke out "among the sheep, and the whole flock of 112 were sacrificed, 11 as diseased and 101 as "suspected. The carcases of the latter, being perfectly sound, were sent for sale to "England." One case lately occurred at Antwerp on a milkman's premises, and was traced to a smuggled cow. The market was at once closed, and all egress of cattle from the town prohibited until further orders. The ravages, however, which the Plague continues to make in South Holland, and its threatened advance into North Brabant, naturally excite great apprehension in Belgium; and a short Bill has just been introduced by the Government, which, if passed, will vest in the Executive powers virtually unlimited over both internal traffic and foreign commerce.†

Nor has the disease been suffered to gain a footing in France. An animal bought at Malines immediately before the promulgation of the decree of the 5th September had been the means of introducing it, but it was promptly suppressed, at a total cost, says the Minister of the Interior, in an official report to the Emperor, of not more than 43 head. It reappeared in November, in the *Jardin d'Acclimatation* of the Bois de Boulogne, having been carried thither by two gazelles brought from India, which had been for three or four days in London. From them it rapidly spread to yaks, zebus, goats, and fallow deer, and the sacrifice of about 35 of these animals was necessary to arrest its progress.

III.

As the disease has extended itself in this country, several Orders in Council have been issued. The general result of these orders has been (1) to circumscribe the powers of the inspectors; (2) to enlarge those of the local authorities; (3) to replace the latter by new local authorities, with a new sphere of jurisdiction. The inspectors were deprived of the power to slaughter, except in cases where the owner had disobeyed the inspector's order for the separation of sick animals from sound; the local authorities were armed with power to prohibit animals from being brought within their jurisdiction, except under such conditions as they might think fit to impose; and the Secretary of State was empowered to close a fair or market in any district where the local authority had refused to do so, on a complaint from the local authority of a neighbouring district. Finally, for the Justices of Peace in each petty sessional division of a county were substituted the Justices of Peace for the county in General or Quarter Sessions assembled; the area of jurisdiction being enlarged accordingly, and the power of restraining traffic so extended as to restrain the movement of cattle within each area as well as ingress into it, but not mere transit or egress by railway.

Under the powers thus created Orders of Quarter Sessions have been made in every county of England and Wales prohibiting or restricting generally the movement of cattle

* Mr. Barron's Report. This is confirmed by the last Report of the Minister of the Interior.

† The whole Bill is as follows :—

"Art. 1. Le Gouvernement est autorisé à prescrire par arrêté royal les mesures que la crainte de l'invasion ou l'existence de maladies épizootiques, peut rendre nécessaires, tant dans l'intérieur du pays que sur les frontières, en ce qui concerne les relations de commerce avec l'étranger.

"Art. 2. Un règlement déterminera les conditions et le taux des indemnités qui pourraient être accordées aux détenteurs d'animaux malades ou suspects dont l'abatage serait ordonné.

"Art. 3. Les infractions aux dispositions prises en vertu de l'article 1er, seront punies d'un emprisonnement de trois mois à deux ans et d'une amende de cent francs à mille francs, soit cumulativement, soit séparément.

"Art. 4. S'il existe des circonstances atténuantes, les peines d'emprisonnement et d'amende pourront être réduites à celles de police."

into and within the several areas of jurisdiction. These Orders, however, exhibit many varieties of detail. By some all movement is stopped, even from one part of a farm to another if a public road intervenes. Movement on farms is permitted by others, sometimes with permission granted by a justice or justices, provided the extent of highway traversed do not exceed a space varying from 100 to 440 yards, whilst occasionally the freedom of the farm from disease for a given but not uniform period must be proved before the highway is crossed at all. In most counties cattle may be moved for slaughter or for breeding purposes under licence, which may be granted, in some by one justice, in others by two; but in the nature of the declaration on which the licence is founded, the signatures by which that declaration is to be attested, the time for which the licence is to hold good, the facts to be proved, there is remarkable diversity. The animal must have been on the farm, generally speaking, for a period varying from 14 to 30 days; the farm must have been free from disease for a period varying from 14 days to two months; and in some cases no disease must have occurred within a certain distance, varying from a quarter of a mile to five miles, of the farm itself or of the route to be travelled. In one or two instances it is further required that the beast should not have been brought into contact with newly purchased stock, or exposed in a market within a given period. In the majority, all removals between sunset and sunrise are forbidden. Some Orders include cattle, sheep, and swine; some cattle and sheep; some horned cattle only. These examples by no means exhaust all the diversities discoverable in this mass of local regulations—diversities doubtless justified here and there by the varying circumstances of different counties, but evidently arising in a very great measure from mere want of concert, and probably destined, if they are maintained, to beget considerable dissatisfaction and inconvenience.

IV.

In our First Report we humbly submitted to Your Majesty the conclusions at which we had arrived respecting the general character of the disease, and the measures which should be adopted with a view to arrest its progress. We agreed (Mr. M'Clean dissenting) in the opinion that the only reasonable hope of effecting this object lay in imposing, for a limited period, restrictions of a very stringent kind on the movement of cattle, and that these restrictions should be uniform, and should be carried into effect at a time when the disease had not spread to an unmanageable extent, and when they would be attended with fewer difficulties and with far less of loss and inconvenience than must necessarily surround them towards the approach of spring. We differed in some degree as to the amount of stringency which we might reasonably venture to recommend. We think it right to say (Mr. M'Clean still dissenting) that the opinions in which we then concurred not only remain unshaken, but have been materially strengthened and confirmed by the deplorable experience of the last three months.

After laying before Your Majesty our Recommendations on this head, it remained for us to pursue the investigation which we had already begun into the nature of the disease, with a view to ascertain how far it could be combated by curative or preventive treatment. This investigation included a thorough and minute observation of the symptoms and progress of the disorder and careful inquiries into its general and chemical pathology and morbid anatomy, a microscopical examination of the tissues and fluids of the bodies of diseased animals, a trial of various methods of treatment, experiments on disinfection and ventilation. It was further desirable to ascertain by actual experiments to what other animals it was communicable.

These inquiries were committed, under the general superintendence of the medical and scientific members of the Commission, to the following gentlemen :—

1. Nature, Propagation, Progress, and Symptoms of the Disease; J. B. Sanderson, Esq., M.D.
2. General Pathology of the Disease, and its Relation to Human Diseases; C. Murchison, Esq., M.D.
3. Chemical Pathology of the Disease; W. Marcet, Esq., M.D.
4. Morbid Anatomy of the Disease; J. S. Bristowe, Esq., M.D.
5. Microscopical Researches on the Disease; Lionel S. Beale, Esq., M.D.
6. Treatment of the Disease; George Varnell, Esq., M.R.C.V.S., and William Pritchard, Esq., M.R.C.V.S.
7. Disinfection and Ventilation; R. Angus Smith, Esq., Ph. D.

On several of these heads no definite conclusions could be formed without long and laborious inquiry. On most of them we have already received Reports, and all the Reports will very soon be completed. We shall then lose no time in laying them before

Your Majesty, together with a brief general account of the results reached by the different lines of investigation. This will form our Third and last Report.

An experimental investigation of the nature and treatment of the disease was commenced at an early period by several gentlemen of high professional and scientific eminence at Edinburgh, and a valuable Report by them has been already published. These gentlemen are continuing their researches, and have undertaken to place in our hands a further report upon the subject.

A large mass of statistical information respecting the progress of the disease has been collected by the Veterinary Department of the Privy Council Office; and the Department has also obtained, by printed forms very extensively circulated, information respecting the various modes of treatment which have been practised in different parts of the country, and their respective results. A comprehensive digest of the information so procured under both heads is being prepared under the direction of the Secretary of the Department, and we hope to be enabled to append this digest, with some illustrative maps, to our Third Report.

Some further evidence, oral and documentary, respecting the progress of the disease, the condition and inspection of cow-sheds and slaughter-houses in the metropolis, the precautions enforced and accommodation provided at the various landing-places for foreign cattle, and the provision made for the proper transport of live stock on the railways of the United Kingdom, is appended to this Report.

V.

We shall abstain in our present Report from entering into the results of the scientific inquiries to which we have referred. There are, however, some points of more or less practical moment, to which in closing our inquiry we think it right to advert.

All endeavours to discover a method of treatment on which some reliance could be placed have entirely failed. Innumerable suggestions of this kind have been made or communicated to us, to none of which any substantial value could be assigned, and the knowledge and ingenuity of practitioners in every part of the United Kingdom have been exerted for this object in vain. The experience of the Dutch physicians and veterinary surgeons during the present outbreak appears unhappily to coincide on this point with our own.

Vaccination is not a protection against Cattle Plague. Careful experiments, conducted at our desire by the most experienced operators, have shewn that an animal successfully vaccinated, and in which cow-pox has been fully developed, may, within a few days after exposure to the infection of Cattle Plague, contract that disease and die of it. We have at present no evidence that vaccination fortifies the system against this new assailant in any degree. The experiment, however, is now being made on so great a scale (upwards of 27,000 having been vaccinated in Cheshire alone), and under such a variety of circumstances, that, should this statement require any material qualification, the public will soon have full information on the subject.

The possibility of mitigating the virulence of the disease by inoculation with the matter of the disease is a subject of much interest, and has engaged our attention. Such inoculation has been tried repeatedly, and on a considerable scale, by the Russian Government, and the effect of a long series of transmissions has been carefully noted and recorded; but the experiment has not been very successful, and it has for the present been abandoned. The Dutch Government, though much pressed to introduce it in South Holland, has refrained from doing so for fear of the consequences. (*Rapport aan den Koning*, 23d Jan. 1866.) Whether modes of inoculation may not yet be found which will effect the desired object is a question which can only be solved by various and repeated trials. Further information on the subject will be given in our Third Report. It is obviously unadvisable that any experiments of this kind should be tried, unless by persons of competent scientific knowledge, and under the strictest precautions to prevent the spread of infection.

The only means of combating the disease which remain consist in the stoppage of the movement of stock and of things likely to be vehicles of infection, in the isolation and slaughter of infected cattle, and in the use of disinfectants.

The careful and thorough use of disinfectants, which attack and neutralise the poison either when floating in the air or when adhering to solid or liquid substances, cannot be urged too strongly. In every locality measures should be taken to circulate information as to the best disinfectants, and to ensure their being used. Some ready and effectual compounds for disinfecting the air, for cow-houses, waggons, ships, and moveable articles,

especially of metal, and for fresh hides, horns, and hoofs, are described in a note ;* but we hope to supply more detailed information on this subject in our Third Report.

But it is still necessary, and it will not cease to be necessary, to insist on the measures on which so much stress has already been laid—and of the importance of which the country is now fully aware—on the restriction of movement, and on isolation. Recent experience appears to indicate further the expediency of slaughtering infected cattle, provided this can be done without injustice to the owners. By what means this can be best accomplished,—whether by voluntary associations, such as that in Aberdeenshire, or otherwise,—what may wisely be done by the Legislature or the Executive to promote and encourage such associations, or to assist in other ways the desired object, are questions on which this Commission possesses no special information, and which will soon no doubt be discussed in Parliament.

We have one thing to add. The subtle poison of this disease has now diffused itself through the country, and our principal danger is at home, and not in importations from abroad. But the question, what permanent regulations must be made to prevent the re-importation of it hereafter from infected countries, is one which must be considered sooner or later.

The importation of foreign cattle is large, and largely increasing. It is found profitable to bring them from countries where this disease is a frequent guest, and in the near neighbourhood of which it commonly dwells. Hungarian bullocks fetch in the English market a price sufficient to repay the importer. The time required for transit is not well ascertained, nor is it very important to ascertain it, for it is always liable to be shortened by improved arrangements ; and an animal which has travelled in a drove, truck, or ship-load, may well be diseased on its arrival here without having been so when it started on its journey. As to the countries from which cattle come, there can often be no certain knowledge ; they are sent, for the most part, to England by foreign dealers resident in German towns, are consigned to salesmen here, and sold on commission. Hamburg and Rotterdam, from which the chief importations come, are the terminal stations of the great network of German lines, branches of which run into Hungary, Poland, and Gallicia, and will soon be pushed up to the Bessarabian frontier. The Dutch ports alone have sent us not less than 150,000 cattle and 250,000 sheep in a year. Cattle which have stood in the markets of Magdeburg or Berlin have undoubtedly undergone inspection, and, if brought from an infected district, quarantine. But we think it useless to trust to any inspection or other precautionary measures which foreign Governments may be induced to apply to cattle leaving their own ports or frontiers, or in the case of through traffic. Such precautions may be desirable, but no real reliance can be placed on them. We must be prepared to meet the danger when it reaches our own shores. We receive, during several months in the year, from 5,000 to 10,000 animals a week, which are landed at a few ports, and thence dispersed all over the country. More than half of the entire number land at London ; upwards of six-sevenths at the three ports of London, Harwich, and Hull. Against the peril which must lurk in these great importations mere inspection will always be a very imperfect defence, even if conducted with greater local facilities and under more careful supervision than seems to have been the case hitherto. There is in fact but one class of precautions likely to be effectual—viz., to restrict importation absolutely, except in case of stress of weather, to a certain number of ports, where proper accommodation could be provided ; to cause all fat cattle to be slaughtered at the ports, and all store cattle to undergo a period of quarantine. Hides and skins from any part of the Continent, not dried as well as salted, ought to be disinfected at the port of importation.

The evidence which we have received on some other points on slaughter-houses and cowsheds in the Metropolitan District, on the substitution of dead meat markets for live cattle markets, on the inland conveyance of cattle by railway, and on the cleansing and regulation of sea-going cattle boats—we lay before Your Majesty, without founding any recommendation on them. The present calamity has shown how defective are our

* The experiments of Dr. Angus Smith shew that the best disinfectants are carbolic acid (or M'Dougall's powder) and chloride of lime. Both of these should be freely used in all sheds, and for waggons and trucks, not only in infected districts, but throughout the country; the walls, floors, and roofs being all well washed. Some of the carbolic acid passes into the air, which it purifies. Hides should have common salt spread vero them for twelve hours, and afterwards be washed in a solution of carbolic acid and water (two ounces of acid to the gallon), or be laid in a solution of chloride of lime ($\frac{1}{2}$ lb. to a gallon of water) for ten minutes. Manure should be burnt, or, if this be impracticable, should be disinfected with carbolic acid, and deeply buried. For washing purposes, Dr. Angus Smith recommends M'Dougall's disinfecting soap, which contains crude carbolic acid.

general precautions—if any precautions can be said to exist—for the detection and prevention of contagious cattle diseases, and we trust that it will give an impulse to improvement in these respects, and that the subject will be reconsidered hereafter. It lies, however, beyond the scope of our Commission, and we content ourselves with directing attention to it.

(Signed) SPENCER.
CRANBORNE.
ROBERT LOWE.
LYON PLAYFAIR.
CLARE SEWELL READ.
HENRY BENCE JONES.
RICHARD QUAIN.
E. A. PARKES.
(Subject to views appended to First Report.) J. R. M'CLEAN.
THOS. WORMALD.
ROBERT CEELY.
CHARLES SPOONER.

5th February 1866.

MOUNTAGUE BERNARD.

MINUTES OF EVIDENCE.

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MINUTES OF EVIDENCE

TAKEN BEFORE

THE CATTLE PLAGUE COMMISSIONERS.

RECORD CLUB
PALL MALL

Tuesday, 28th November 1865.

PRESENT:

Earl Spencer.	Dr. Parkes.
Viscount Cranborne.	Mr. Wormald.
Mr. Read.	Mr. Ceely.
Dr. Bence Jones.	Professor Spooner.
Dr. Quain.	

EARL SPENCER in the Chair.

Colonel The Honorable Wellington Patrick Chetwynd Talbot examined.

Col. The Hon. W. P. C. Talbot

28 Nov. 1865.

4294. (*Chairman.*) I believe you have a farm near London ?—Yes ; within six miles of the Marble Arch.

4295. Do you keep a considerable number of dairy cows there ?—I have 100 cows milking now, I believe.

4296. Have you up to the present time suffered from the Cattle Plague ?—No, ; I have not suffered from it. I have had no cases at all.

4297. What precautions have you taken to avoid it ? —Perhaps I had better state at once, without troubling your lordship to question me, all the precautions I have taken ; probably that would be the shortest way of laying the facts before the Commission. In the first place I employ a cattle dealer to buy cows for me, with instructions that he is to buy them at the farmhouses, where he believes that there is no infection as far as he can find out. He then puts them on to the railways at small stations where there is no great congregation of cows. He disinfects the trucks himself (at least he tells me that he does so), with chloride of lime, and so forth. The moment they arrive on my farm, all the cows are disinfected with Burnett's disinfecting fluid ; they are washed thoroughly all over with it, and they are kept in successive lots. I desire him to buy eight or ten at a time, so that I can keep then separate. They are then put into a field by themselves, and one field is left between each lot of cows empty. When they have been there three weeks, we will say, they move on in succession. I then have a separate shed for them rather more than a quarter of a mile from the main building, and when they have calved they go into this shed, where they are attended to by a man who has no access whatever to the main building. He lives in the village, and comes and attends to these cows, and nothing else. After being there they are again disinfected before they are allowed to come up to the main shed ; they do not come up to the main shed until they have been there for eight or ten days. As soon as those cows have been separated they get an ounce of nitre dissolved in a pint of cold water every other morning, and half a pint of prepared charcoal is given between two cows every morning. Their noses are washed with vinegar and water mixed in about the proportion of half and half. I am speaking now of the cows that are in quarantine. Burnett's disinfecting fluid is used freely throughout the whole of the sheds with a watering pot, and a man goes all round the sheds, and waters in front of the cows' noses where they breathe. All the drains are carefully washed with this Burnett's disinfecting fluid every day. In addition to that I hang a lot of cloths or rugs or sacks about the beams of the building saturated with this Burnett's fluid ; and I also limewash the sheds every month with a mixture containing this fluid, so that it keeps the smell off altogether. No stranger or butcher is on any pretence whatever admitted into my sheds. My men were ordered not to mix with the cow men belonging to other people when the disease was close to me ; and when the cows of a neighbouring cowkeeper to me were suffering from it, I begged these men to go to another public house on the other side, which I believe they did. I attend to the ventilation as well as I can. I keep the sheds as open as possible, and I remove the manure from around the sheds as often as I can possibly do so, so as to have no accumulation of manure about them. I think that is pretty nearly the whole of the precautions which I have taken.

4298. Have your neighbours suffered very much from the Cattle Plague ?—Yes ; several of my neighbours have lost all their cows within a very short distance of my sheds.

4299. (*Mr. Read.*) How near to you ?—I should think the nearest shed is perhaps half a mile, but there have been cows within 300 or 400 yards of my cows which have since died in the fields.

4300. (*Chairman.*) Do you know any of your neighbours who have followed out the same precautions as yourself with equal success ?—No ; I do not know that they have followed them out at all. I do not know whether it is worth while for me to relate a circumstance which I am acquainted with, about a cow going to a bull ; but as it is a curious thing, you may be interested in hearing it. Some short time ago, I suppose it is now two months ago, although it only came to my knowledge the other day, a neighbour of mine sent a cow to a bull belonging to a cowkeeper who had the plague amongst his cows. When my neighbour got the cow home he found out that the Plague was amongst those cows, and he came up to the bailiff in great distress, and said he heard that my measures seemed to be efficacious, and he wished to know what I was doing. My bailiff told him what I was doing ; he administered

Col. The Hon. W. P. C. Talbot.

28 Nov. 1865.

the charcoal and nitre, and so forth. The bull to which the cow had been died three days after bulling her, but the cow is still alive, at least it was alive a week ago; it never took the disease at all; it remained perfectly well.

4301. (*Mr. Wormald.*) How long ago was that?—I cannot tell the exact date; I heard it a week or ten days ago, but I think it had happened some time previously. It accidentally came out in conversation with my bailiff; he did not tell me of it at the time.

4302. (*Chairman.*) What is your view as to the origin of the Rinderpest?—If I am to give an opinion at all, I believe myself that the disease is an epidemic, but after having once come into the country it is highly contagious and infectious. I believe that to be the case everywhere. I do not attribute the origin of it to infection in the first instance.

4303. Do you believe that it could have broken out in the London dairies in the first instance?—I think there is a great misconception about the London dairies. I think people are apt to accuse the London dairies of being much more unhealthy than they really are, because I have heard of dairies kept really in the worst way, which nevertheless have been free from diseases before this Plague came; I mean as free as any other place. I do not believe that the London dairies are the focus of contagion myself. I think that dairy cows fed as we feed them are more liable to disease than any other cows. I believe the feeding them on brewers' grains destroys the constitution of the animal in time, and therefore they become more liable to disease than cows fed in the fields. I believe the drain upon the constitution by feeding cows upon grain is very great. The object of course is to force the milk, but when anything happens to a milking cow, the milk stops all at once; and this sudden stoppage must have a great effect upon the system.

4304. What is the usual custom with regard to renewing the cows in a dairy?—I keep my cows so long as they give me milk enough and make flesh enough to answer my purpose; the moment I think a cow does not pay her way I sell her, whatever her condition may be.

4305. Can you say what is the average time for which you keep a cow?—I should think it is from eight to ten months.

4306. You are constantly, therefore, buying and selling cows?—I am constantly buying and selling; within the last three weeks I have bought between 30 and 40 cows.

4307. I suppose that is the case with almost all cowkeepers?—It must be the case.

4308. In that way, I suppose, if there is any disease in a market, cowkeepers are more liable to it than breeders of stock?—Certainly. I think that is the case, because they must communicate more with other cattle.

4309. That would be one reason why this disease has made much greater havoc in the metropolitan dairies than elsewhere?—Certainly; and it is a serious risk now. I feel every time I buy a cow that it is a serious risk.

4310. (*Mr. Wormald.*) What number of fresh cows have you had since this disease first commenced?—I should think I have had 40, probably. At first I was very much alarmed about the disease, and kept my cows as long as I could without buying others; but now the time has come when they have got very fat, and give no milk, and I must change them, or give up the business altogether. At first I abstained from buying as long as I possibly could; but then I made up my mind that I must either give up the thing altogether or buy some more.

4311. Do you do anything specially to disinfect the manure?—No. I do nothing of that sort. I should do so if any cattle had the Plague; in that case I should certainly throw Burnett's disinfecting fluid over it; it is a very useful thing. Burnett's disinfecting fluid destroys all smell. You probably are aware that in the neighbourhood of a cowkeeper's sheds, there is always a smell; you may smell it 200 or 300 yards off; now you could not tell that there was a cow upon my premises; you may walk into the sheds, and you will perceive no smell whatever, though they are very rough premises; they are nothing more than old barns converted into sheds.

4312. There is plenty of ventilation?—Yes; plenty of ventilation, and I made the drainage as good as I could.

4313. (*Chairman.*) Do you consider it advisable for those who wish to avoid the infection that they should not purchase in the open market at present?—Decidedly. I think the weekly markets held in large towns are the most dangerous centres of infection. I might mention, for example, Liverpool, or perhaps I had better take Wolverhampton. I was in Staffordshire yesterday, and I found that the local magistrates there are very shy of interfering under these circumstances. The Wolverhampton market belongs, I believe, to the corporation, who lease the standings in this market to the butchers, and the cattle are brought to the weekly sale there; and they say, "If "we stop the market, the butchers might bring an "action against us for breaking their lease." Therefore, unless the markets are stopped by a central authority, nothing will be done. Those markets are the centres which, having become once infected, are disseminating the infection all over the country.

4314. (*Chairman.*) I suppose that it is particularly the case in London, that when the cowkeepers find their cows falling sick, not knowing perhaps that it is a very dangerous thing, they send them into the market, in order to turn them into capital as soon as possible?—Yes; and I can speak of it as regards my own case. I sent two cows yesterday to the market. I was told that they were beginning to be ill with pleuro-pneumonia. My orders are: "If you find "anything the matter with a cow, do not mess with "her; send her into market." Of course the cowkeepers look at the way in which they can make the most of them. My experience is, that the more you treat these animals the worse they become; they are of no use after they have gone through a process of dosing and physicking.

4315. (*Mr. Wormald.*) They are of very little use even if they do get well?—Exactly; they are mere wrecks.

4316. (*Chairman.*) Is there any difference between the health of cows in London itself and in the suburban parts, such as Willesden and Hendon?—I really do not see that there is. Lord Granville, who has a farm steading out in the country, has lost, as you are aware, all his animals; and Mr. Panter will tell you that he has lost a great many by pleuro-pneumonia from time to time, and he has got the foot-and-mouth disease now.

4317. Is the treatment in the suburban farms the same as that in the London dairies?—Yes.

4318. (*Mr. Read.*) By "treatment" do you mean dietary?—Diet and management.

4319. (*Chairman.*) You do not turn out the cows in the country more than in London?—No; my cows never go out at all, if I can possibly help it.

4320. Have you had any experience of the result of occasionally turning them out as regards the quantity of milk?—Yes. In the year before last we had a very dry season; we usually cut the lattermath grass, and bring it into the sheds to feed the cattle with; but it was so very dry in the autumn of the year before last that we had no grass to cut, and therefore we were obliged to turn the whole herd out. The consequence was, that I lost a very considerable quantity of milk, and also the cows sank very much in flesh. It did not answer at all; we were obliged to do it, or else we never should have done it.

4321. (*Mr. Read.*) At what time of year was that?—In the month of August.

4322. The weather was hot and dry?—Yes; there was no grass to cut, and we could not get any lattermath.

4323. Perhaps there was not very much to eat?—There was not much to eat either.

4324. Could you give any idea of what is the average mortality of your 100 cows?—No, I do not know that I could. I could not answer that question. I never have put it in that way; it is difficult to arrive at the average mortality, especially when you sell them alive, in order to save their dying on your hands.

4325. Have you had many cases of pleuro-pneumonia?—I have had several lately. I have had as many, I should think, as twelve within the last six weeks.

4326. Do your cows get the foot-and-mouth disease?—Yes; they have had the foot-and-mouth disease also, and that is likewise a very serious disease.

4327. Those two would be your principal diseases hitherto?—Yes.

4328. Will you tell us what sort of diet your cows have?—They are fed differently at different times of the year. Supposing I begin at this time of the year, they are fed upon mangel-wurzel, of which they get two feeds in the day; and they have hay and mangel-wurzel tops also. I am now giving them the mangel-wurzel as long as they last, tops and roots together; that produces more milk. And they have hay, and barley and oatmeal mixed, and twice a day they have brewers' grains.

4329. I suppose in summer you substitute grass?—Yes, we give them grass in summer. We begin first of all with vetches; that is the spring feed. I grow a piece of vetches always. When those are consumed I go to the grass. When that has got too old I come upon the clover, then I give them the latter-math grass, and then we begin with the mangel-wurzel tops. We strip the mangel-wurzel leaves in order to give them always some green food.

4330. Is the mangel-wurzel the only root you give them?—Yes.

4331. Do you give them cabbages?—I do give them cabbages if I have them; they are excellent.

4332. How do you give the charcoal?—My man takes a little half-pint measure, and mixes it with the grains. All these dairy cows are fed in pairs. He mixes this charcoal with the grains, and stirs it all up together.

4333. They stand in stalls in pairs?—Yes; they are fed in pairs.

4334. Have you any difficulty in getting them to eat the charcoal?—Not the least. I may mention a curious thing which occurred a little time ago with regard to the charcoal. My bailiff, a most practical man, and who understands the keeping of cows most thoroughly, told me that usually in drenching these dairy cows there is some unpleasant smell coming from the cows' breath. I ordered nitre to be given every other morning, therefore he was drenching 50 or 60 cows every day. He told me that after they had had the charcoal a little time there was not the slightest smell coming from their breath at all; it was perfectly inodorous. He said he thought the charcoal must have a great effect upon it. That was the result of that treatment.

4335. You have stated that you studiously excluded all butchers from your sheds?—Yes; everybody. My orders were to turn away every one, including the inspector, and I said I would fight it out with the Government afterwards, because I consider that the inspector is the most likely man to bring the disease to my premises. I have given strict orders that he is not to be admitted into my premises, unless I have the disease; then I would admit him.

4336. I think you said that when the disease was once in the country you thought it would spread in all directions; do you consider that the disease was brought in, or that it originated in this country?—I believe it to be epidemic in reality, as well as contagious. I believe it to be highly contagious when it is once established.

4337. What sort of cows do you buy principally?—The common short-horn cow, well selected; a good class of animal.

4338. You do not generally keep them above eight or ten months?—No; some few go on longer. I have had them as many as fourteen months; others have gone through in six or seven months.

4339. Do you buy them in milk or in calf?—In calf whenever I can get them.

4340. After the second or third calf, or what?—As I can get them. It is not very easy to get them at four years old; they are generally too old; but if I had the choice I would rather buy them at four years old.

4341. Do they come from the Midland Counties or from the north?—From the Midland Counties generally; from Buckinghamshire, Worcestershire, and Gloucestershire.

4342. When a dairyman in the country has a big old cow he generally sends her to you?—Yes; a good many come in that way. Of course I try to avoid the old ones as much as I can.

4343. (*Mr. Wormald.*) You said that you preferred cows about four years old; I suppose that would be when they had had the third calf?—Yes; or the second calf. My reason for wishing to have them at that age is that they are much better for the butchers afterwards.

4344. You have two objects in view, to obtain milk from them at the time, and to sell them to the butchers afterwards?—Yes; one object is that I get as much milk as I can, and the other that the animal shall be as fat as possible afterwards, when I sell it. I give them whatever they will eat. I do not care how much they eat; I believe it pays in the additional quantity of flesh when they are sold and in the improved quality of the milk.

4345. Do you mix anything with the mangel-wurzel you have spoken of?—No; I just give it them as it comes out of the field.

4346. Is it pulped?—No; I tried to pulp the mangel-wurzel, but I thought it made the cows scour. I also tried steaming, but I thought it did not answer at all. It does with turnips, perhaps, but not with mangel-wurzel. I think the less you meddle with mangel-wurzel the better. I never cut my mangel-wurzel; I give them whole to the cows, and I think the cows are better upon them in that way. It also saves the expense of cutting, and I think the cows like it better; it is more natural to them.

4347. (*Mr. Read.*) What quantity of mangel-wurzel have they in a day?—I really could not tell you that exactly, but they have a scuttle full; a bushel. Mr. Panter will tell you all that; he is coming directly.

4348. (*Mr. Wormald.*) Are you careful about the condition of the food, to see that it is not in a fermenting state?—The grains are given as we can get them; they are some time in the graining pit, and then they are carefully pressed down; but we often get them from hand to mouth as fast as possible, and then they are fresh.

4349. You prefer having them fresh?—Yes; I prefer them fresh.

4350. (*Chairman.*) I suppose you have a great abundance of grain?—As many as I can use. Unfortunately before this Plague was known or apprehended, I and many others entered into a contract with brewers for grains during the twelvemonth. The consequence is that many cowkeepers have been obliged to throw their grains away; they have been throwing them on their manure heaps. It is not of much importance to me because my contract is out at Christmas.

4351. (*Professor Spooner.*) Then you disapprove of grains as a food for cows?—I do not disapprove of it, because nothing produces so much milk as grains, but I think it is an irritating food, and a forcing food to the animal.

4352. When your contract is out, I presume you will cease to give grains?—Not at all; I should lose enormously in the milk, if I did.

4353. About what quantity of hay do you give per day to your cows?—I could not tell you what the quantity is by weight myself, but Mr. Panter will

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answer those questions much better than I can; he knows exactly. I have known, but I have forgotten again, what the exact weights are.

4354. (*Dr. Bence Jones.*) Do you use bran?—Not except in cases of illness.

4355. (*Chairman.*) Have you any means of comparing the quality of the milk from London dairies, and which is produced by cows managed in the way in which you manage yours, and the milk which comes from the country?—I have no means of comparing them, but I have not the slightest doubt that the milk produced by feeding them on grains is very much poorer than the milk produced in the ordinary way.

4356. It has been suggested by some people that it would be desirable, for the prevention of diseases among cattle, to do away with the London dairies; have you any opinion upon that subject?—I really do not myself think that it is necessary to do away with the London dairies altogether. I think, as I said before, that cows fed under the conditions under which we feed ours are more liable to disease than cows fed in the ordinary way. But it would stop an immense supply of milk, which is a very necessary article in London, if the London dairies were all done away with. The milk supplied from dairies in and round London is much more valuable to the milk dealer than what he gets up by the railway; the dealers all tell me that they like to get it warm into their dairies.

4357. It would be rather the management than the locality which is the cause of the greater mortality among the London cattle, in your opinion?—I think it is the management. I do not think the locality has much to do with it. I think all these sheds ought to be maintained with a proper amount of ventilation, and a certain cubic space allotted to each cow, and a certain degree of cleanliness might also, I think, very well be insisted upon. If that was done, I do not see any more reason why a cow should die in London than anywhere else.

4358. (*Mr. Read.*) You think that mangel-wurzel forces the milk to a great extent?—Yes; it makes milk.

4359. And poor milk?—Yes; but you see my object is quantity; I do not care about the quality.

4360. (*Dr. Parkes.*) May I ask what is the strength of the Burnett's disinfecting fluid you use for washing the cows?—I put it into two hundred times its weight of water.

4361. Do you wash them all over the skin?—Yes, all over. For washing the cows themselves, I mix it stronger. I am not sure whether I understood the question rightly.

4362. What strength do you use for washing the cows?—I should put perhaps three wine glasses into a bucket of water; that is about the proportion.

4363. (*Professor Spooner.*) That would be about four ounces?—Yes.

4364. (*Dr. Parkes.*) You stated that the cows were disinfected again a second time?—They are washed over again before they are allowed to go to the main herd.

4365. Have you found any reason to apprehend danger from sprinkling Burnett's disinfecting fluid about in the way you have described?—Not in the least.

4366. You do not think there has been anything like metallic poisoning?—Not in the least.

4367. You spoke of having had the disease close to you; how close was it?—Within half a mile.

4368. Was it very bad?—I believe that a man lost all his cows. Mr. Drury is his name.

4369. What was the distance of the disease from you in the other directions; had you it all round you?—All round, except on one side, I believe, where a Mr. Grey, a clergyman, has the farm next to me. I have not heard of his having had it.

4370. He has escaped equally with you?—I think he has.

4371. Did he adopt the same precautions as yourself?—He could not have done so; his cows are not fed under the same conditions; they are out in the fields. What rather weakens my belief in my remedies being of any great use is that I have not had the diseaase among the cows in the field, to whom I have not given the charcoal.

4372. Can you state what number of cows you have had in the field compared to the number in the sheds?—I should think there are 90 in the sheds, and 20 out now; but the number varies very much.

4373. The 20 have not been in strict quarantine as the others have?—They have all been disinfected, as I term it; then they were turned out into the fields. That is all that has been done. I can do no more to them than that. I may state, however, that no man goes among those cows except my bailiff; he goes among them occasionally, but he does not touch them; and he takes care to have a different man to look after the cows in the field from the men who attend to the cows in the shed.

4374. Upon what evidence did you institute such a system of isolation as you have described?—I did it out of my own head, the moment I had heard that such a plague had appeared.

4375. You did not adopt that system in consequence of any evidence in your neighbourhood of its having succeeded, but you did it in consequence of your own belief that it would succeed?—I did it from my own idea of what was the best thing to do, as any farmer would. I had been very much alarmed.

4376. (*Mr. Read.*) You stated that the disease was close to you; how close was it?—It was half a mile off, or thereabouts, in a neighbouring cowkeeper's shed.

4377. That is half a mile from your shed?—Yes; I should think it would be half a mile as the crow flies.

4378. And 300 yards from the cows in the field?—Yes; 300 yards from the cows in the field. It weakens my belief in the efficacy of the measures which I took, that the cows in the field have not had the disease; that is what I do not understand.

4379. Still you have taken great pains with the cows in the field?—Every possible pains. I may add that the farm is particularly well situated; there are no roads at all. I have some fields that abut upon a high road, but I have never put a cow into them.

4380. (*Mr. Wormald.*) Have you no footpaths?—I have not put a cow into a field adjoining either a high road or a footpath.

4381. (*Mr. Read.*) You have no hunting there?—No, no hunting. Before the Plague began I let the latter-math to a shepherd, according to the custom in our part of the world; he brings his sheep and eats the latter-math off. He used at one time to bring a dog with him, but I have ordered him never to bring the dog without tying him up. I should not like to have him running about.

4382. (*Mr. Ceely.*) Unless you have recently drained the land, there is a great deal of it very badly drained?—I have drained it nearly all.

4383. (*Dr. Parkes.*) Can you give us any idea of the number of cows attacked in your neighhourhood and those not attacked?—I have not the slightest idea, but I know that most of the cowkeepers in the neighbourhood have lost them all, or pretty nearly all.

4384. (*Chairman.*) You rely principally upon isolation rather than medical helps and disinfectants?—I rely entirely upon isolation. As far as my opinion goes, I believe that there is no cure for the disease but to knock the cows on the head when they have got it; that is my private belief.

4385. (*Dr. Quain.*) With regard to the period of the year in which the disease was so near you, was it in summer time, when the flies were about, for it has been said that the flies might propagate the disease?—It was about six weeks ago.

4386. That would be about the middle of October?—Yes.

4387. Comparing a cow establishment in London

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and one at Willesden, for example, with regard to the facilities for getting fodder and water for the cows in the two places respectively, and for getting rid of the discharge of urine and filth, is there a greater facility in the one case than in the other ?—I do not see why a London cowshed should not be just as well kept as a country one. The London cowkeepers bring up their food in the same way for their cows as I do for mine.

4388. Have you an abundant supply of water ?—I have not ; but it may be worth while to add that the water which my cows drink is entirely rain water. I have no spring water about the place ; all that they drink comes from the heavens. I have heard people say that the disease may be carried in the water ; my water is quite free from that danger.

4389. Do you think that there are greater facilities for supplying water to cattle in London or in the country ?—I should certainly say that you could get it more easily than on my farm.

4390. With regard to food, the facilities would be about the same ?—Yes ; but we have it nearer.

4391. With regard to getting rid of the excretions of say 300 or 400 head of cattle, what is done with it in the country ?—Mine runs away and is discharged out of the main buildings in earthenware pipes. I have a cistern for it. I meant to use it over the land, but practically I found that that was not done, and it all flows away down the ditch.

4392. Have you heard that complained of?—Not at all.

4393. Are there houses near ?—No.

4394. Is it possible that it may become a nuisance if you do not make use of disinfectants ?—Not at all. Of course the ditch always smells, more or less, but it only goes down to the high road ; the discharged matter flows along the ditch across the high road under a culvert. Of course there are cases where the discharged matter might become offensive.

4395. Would there be opportunities for getting rid of it in London ?—Yes ; almost easier than in the country.

4396. Is it the case, as far as you know, that the cowhouses in London are mixed in the same blocks of buildings with other houses, and are in that way offensive and injurious to the inhabitants of London ?—I do not see why that should be if care is taken to remove the manure, and if the liquid manure is properly taken away. On the contrary, I have always heard that the smell of cows is very healthy ; but I am only speaking as a private individual, and not in the least as knowing anything about it.

The witness withdrew.

Mr. Charles Panter examined.

Mr. C. Panter.

4397. (*Chairman.*) You are bailiff, I believe, to Lord Granville ?—Yes.

4398. Lord Granville has a considerable dairy farm at Hendon ?—Yes.

4399. What number of cows has he got ?—His lordship originally kept 130.

4400. Has Lord Granville suffered from the Cattle Plague ?—Yes.

4401. Will you just state the particulars of the outbreak at Lord Granville's farm ?—I will read the statement from a letter to the "Times" which Lord Granville published. It contains the particulars as I related them in a letter to his lordship. "On the "13th of July last I purchased five Dutch cows in "the Metropolitan Market, and placed them in quarantine at Childs Hill Farm, one mile from here." (That is Golders Green Farm.) "On the 22d of July "one of them showed signs of debility. Diarrhœa "followed. Thinking it was only a cold, she was "treated accordingly, but continued to get worse, "and died in five days. Two more were attacked "in a similar way, when veterinary advice was "called in, but in five days the whole either died or "were slaughtered. Every precaution was used to "prevent the spread of the infection here. The "men who attended the sick cattle were not allowed "to go among the healthy ones, and vice versâ. But "previous to this, hearing of the disease in the "London cowsheds, I adopted precautionary measures, "such as a liberal use daily of chloride of lime, administered in the proportion of one ounce of nitre in "half a pint of water to each cow, and a small "quantity of tar, and painted their noses with tar. "But on the 8th of August, unfortunately, the "disease showed itself here" (that is at Golders Green) "in a fat cow that had been for 10 months "in the best built, best drained and ventilated shed. "No new stock had been added for nine weeks. In "a few hours four more cows showed symptoms of "it. I immediately had them all removed and "slaughtered, and made a post-mortem examination "of them, and found the windpipes in a state of "decomposition, the lungs inflated, the small intestines red and inflamed, and the meat of a dark "yellow colour outside and a dark red inside, which "I think unfit for human food after the first stage." That was what I told his lordship in the letter I addressed to him.

4402. How many cows has Lord Granville lost altogether ?—Out of the 130 original stock only seven remain.

4403. You stated, I think, that you had not purchased in the Metropolitan Market or elsewhere for some time previous to the outbreak of the disease ?—No ; except the first five I named, which were placed in quarantine a mile away.

4404. Did they die in the place where they were in quarantine ?—Yes. I had Professor Simonds and Professor Brown down to visit them.

4405. Have you been able to trace the cause of the other animals catching the disease ?—Not in the least ; I cannot possibly trace it.

4406. How far off was the nearest case of Cattle Plague to Lord Granville's farm ?—The nearest case was about 400 yards.

4407. Was it about 400 yards from the fields on Lord Granville's farm or from the cowsheds ?—From the cowsheds where the cows were tied up.

4408. When was the last case of the Cattle Plague at the neighbouring sheds ?—The cows lay in the field; it was not in the shed ; it was in the field in which they lay at Childs Hill that it occurred. The last case previous to the outbreak at Lord Granville's farm was about three weeks.

4409. Were you in the habit of letting out any part of the farm to salesmen or butchers who brought animals there which were intended for the Metropolitan Market ?—I let 40 acres this year to a Buckinghamshire salesman.

4410. What was his name ?—Missenden.

4411. Was he in the habit of putting animals there after they had been in the market ?—Yes ; sheep and cattle too.

4412. Was the field at all near the cowsheds ?—No ; it was rather more than half a mile off.

4413. Did you ever observe any infected or diseased animals among those belonging to that salesman ?—Not one ; neither a sheep nor a beast.

4414. Have you purchased any cows lately ?—Yes ; I purchased 12 on the 16th of August ; that was while we had the disease raging at Golders Green. I placed them at Childs Hill Farm, a mile away.

4415. Did those cows suffer from the disease ?—They continued perfectly healthy for six weeks; then two of them showed some signs of illness, and I had them slaughtered, but the rest remained perfectly healthy.

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4416. Have you any disease upon your farm now ?—No.

4417. How long ago is it since the last case occurred?—Nine weeks ago ; that was only a suspicious case ; but I had the animal slaughtered.

4418. What is your opinion as to the origin of this Cattle Plague in Englaud ?—My opinion is that there has never been any proof that it has been imported. My opinion is that it was generated in the London cowsheds during the hot weather of June. I never could see any conclusive proof of its having been imported.

4419. Do you consider it a different disease from any that has been in England before ?—I do. I think it is quite different.

4420. How then would you account for the fact that it has been absent from England say for a 100 years ?—I cannot account for it, except in this way, that this season the temperature has been much higher, as I think it is acknowledged, than we have had it for many years. I cannot account for the appearance of the disease otherwise.

4421. Do you consider that the state of the London dairies themselves is such as to encourage the propagation of disease ?—Not in general.

4422. Do you consider that they are well managed and kept clean, and well ventilated and drained ?—I should think 40 or 50 per cent. of them are. There are exceptions which are grossly mismanaged.

4423. What is the usual mode of treating a cowshed in London with regard to replenishing the stock ?—The usual mode is, that as soon as a cow gets down to about five quarts of milk a day, the dairyman looks at her, and considers what she is worth the most for ; and, as they do not usually breed in London, she is sent to the butcher generally when the quantity of milk gets down to five quarts a day.

4424. There is therefore a constant change going on among the cows ?—Yes ; cows are replaced twice and three times in the year. A person who keeps 50 cows would have to buy quite 100 usually in the year.

4425. What is the average time that a cow remains in a London dairy ?—Not more than six months ; hardly that.

4426. And the moment she gets down to this low supply of milk she is sent into the market to be sold to the butchers ? — Yes ; very often the pleuro-pneumonia takes them off long before that. The London dairies are never free from the pleuro-pneumonia for many weeks together.

4427. How do you account for the London dairies suffering more from pleuro-pneumonia than the country dairies ?—I think it is the result of the unnatural feeding. It comes from the artificial and heavy feeding upon brewers' grains in a great measure, that system being resorted to for forcing the milk to the greatest extent.

4428. Do you consider that the constant purchasing of animals in the market introduces infection to a great extent ?—I have no doubt about it.

4429. What is the usual mode of feeding the animals in the London dairies ? What do you feed them with ?—With brewers' grains in summer and winter too. We give them about a bushel and a quarter, or from that to a bushel and a half to each cow, and about 15 lbs. of hay, and about 30 lbs. of mangel-wurzel, and 4 lbs. of meal in addition to that feed in the winter. In the summer, grass instead of hay and mangel-wurzel.

4430. (*Professor Spooner.*) Of what meal ?—Barley and pea meal. Pea meal principally.

4431. (*Chairman.*) If this mode of feeding damages the constitution of a cow in a London dairy, why is it pursued ?—It is in order to force the greatest quantity of milk which the dairyman can get.

4432. Does not it involve a loss on the part of the dairyman ?—Undoubtedly in one respect, but the gain more than covers all the loss ; at least it is supposed so.

4433. Do you manage your cows in a suburban district like Hendon in exactly the same way as they would be managed in London. ?—Not exactly. We give them more air, and feed them more on grass in the fields. We do not feed them so heavily upon grains and artificial food as they do in London. We give them much more natural food.

4434. Do you turn them out to graze upon your farm ?—We have done so a good deal ; we turn them out from about July to October.

4435. Is that the practice among cowkeepers in districts like Willesden and Hendon ?—Some follow that practice, and some do not. The cows always lose condition by being turned out ; that is invariably the case.

4436. (*Mr. Read.*) Do they lose milk ?—Yes ; they lose milk too to the extent of a quart a day, unless the pasture is very good indeed.

4437. (*Chairman.*) It has been suggested by some writers in the papers and elsewhere that it would be desirable to do away with the dairies in London ; what is your opinion upon that point ? Would it be a desirable thing for the health of the cattle ?—Certainly the London atmosphere cannot be a very wholesome one for the cattle to breathe ; in a great many parts of London at any rate.

4438. Could the trade be carried on without having the dairies in London itself ?—I think so. The deficiency of milk is wonderfully kept up now by what comes from the country. Milk is brought by train, and London seems to suffer very little as regards the quantity of milk since the Cattle Plague has been in existence.

4439. Do you consider that the milk you have at Hendon is better than the milk that is produced actually in the cowsheds in London ?—I do.

4440. What is the practice in a cowshed in London, when a dairyman finds that some of his animals have fallen sick with any disease ?—The usual practice is to send them direct to the market to be slaughtered for what they are worth, if the cowkeepers are once satisfied that it is the pleuro-pneumonia. If it is the foot-and-mouth complaint they would keep them to go through it.

4441. If they were not prevented by law I suppose they would be anxious to do that also in the case of the Cattle Plague?—Yes.

4442. I suppose that a great many animals with incipient Cattle Plague upon them have been sent out to the markets in those ways ?—Yes ; hundreds and thousands. I have witnessed them myself in the Metropolitan Market with the Plague upon them ; some in its first stages, and some in the more advanced stages.

4443. That would be a ready means of communicating the disease, I suppose ?—It would.

4444. If the animal is too much diseased to pass the inspector in the market, what becomes of it then ?—The inspector condemns it, and it is sent to the slaughterhouse ; there it is slaughtered, and the meat inspector then inspects it, and if it is considered unfit for human food it is condemned, and sent to the knackers. If it is considered fit for human food, it is passed, and goes to Newgate.

4445. (*Mr. Ceely.*) I think I understood you to say that in the London dairies they get a larger quantity of milk, but the quality is not so good as that obtained in the rural districts ?—Yes.

4446. In what respect is the quality different ?—I think the difference is on account of the extra feeding. The quantity of the milk is forced by grains and mangel-wurzel, and distillers' wash, to such an extent in London that the milk becomes much thinner.

4447. You do not think that there is more cream in the milk produced in the London dairies than in what comes from the country ?—The only reason why the milk-sellers sometimes say that there is more cream in the London milk is, because it is set for cream much earlier than it can be when it has to travel. When milk comes up from the country there is the friction of travelling, and it gets cold.

4448. Is it your opinion that the milk coming from

the country, from Aylesbury, for instance, is better in quality than what is produced in the London dairies?—Yes; no doubt what comes from Aylesbury and Swindon at present is much better than what the Londoners ever had before.

4449. (*Chairman.*) Could the milk be carried in that way in summer?—There would be some difficulty in keeping it sweet unless the trains were put on differently to what they are now. If the railway companies would accommodate the farmers it could be done.

4450. (*Mr. Ceely.*) What is the average quantity of milk that a good cow is supposed to yield? How many quarts per day?—It varies according to the different stages after calving. I can state the average of Lord Granville's 130 cows. We consider that about 11 quarts is a good average; that would be partly for cows in milk six months, and some three months, and some one month. Our best cows average from 18 to 20 quarts a day, and now and then they come up to 25 quarts, but that is quite an exception.

4451. (*Dr. Parkes.*) Had any of the 130 cows been turned out at all before the time when they were taken ill. I think they were taken ill on the 8th of August?—They had not been turned out before then, but as soon as the Plague attacked them they were turned into a large open space where there was plenty of good grass and water.

4452. They had not therefore been at all near the fields where Mr. Missenden's cattle were?—No; they were kept closely tied up, and supplied with the West Middlesex water from the Thames, brought down in pipes for a distance of five or six miles.

4453. With regard to the ventilation in the best shed, what space do you give to each cow in that shed?—Dr. Lankester came down and measured it recently. I think he said it was 1,200 cubic feet to each cow.

4454. That is the largest space that you give?—Yes.

4455. What means of ventilation have you?—We have ventilation along the roof, and at each end. There are four windows, not opposite to each other, but placed across in a triangular manner. It is a shed about 100 feet long, with six double doors. We always leave the top door open when the state of the atmosphere will allow of it.

4456. Then the air in the shed is comparatively pure?—Yes; it is open to the field, and it is on high ground.

4457. Does the air seem pure to the senses when you go in. Does it strike you as pure?—Yes; generally. The cows stand head to head, with a four-foot pathway between them. The breath of the cows strikes you as being hot in walking down; otherwise, except when the weather is extremely hot, there is a very nice air in warm weather.

4458. Is the ridge ventilation continued right along?—Yes; one ridge tile is raised above the others in this way (*describing the same*).

4459. That was the shed where the first cow was attacked?—Yes.

4460. That being your best ventilated shed?—Yes; it holds 50 cows.

4461. I suppose a man going into that shed had in reality been near to the Dutch cows that had been ill, had he not?—Certainly not. I, myself, did not go near the place on the same day and with the same clothes. The Dutch cows were a mile away.

4462. You took the greatest trouble to avoid any infection?—The greatest possible pains.

4463. Could you imagine any kind of connexion which might have taken place between those cows and those in your shed?—I believe there was none at all.

4464. You examined into all the circumstances of the case?—Yes, every one.

4465. (*Mr. Read.*) I think you said that in your opinion the disease originated in the London cow-houses?—Yes, I think so, from the fact that I cannot see it proved that it was imported. I have attended the Cattle Market continually, and the foreign cattle have been the most healthy during the worst part of our disease in the months of July and August, which were the worst in London.

4466. Are you aware at what time the disease broke out?—Yes.

4467. Are you aware of the time when the first cases occurred?—Yes.

4468. When was it?—In June.

4469. Was there anything particularly hot or otherwise remarkable in the month of June this year?—I believe so, most particularly.

4470. In the month of June?—Yes; it was remarkable for the heat; it was both a very dry month and a very hot month. I was reading the register of it only this morning in the "Mark Lane Express."

4471. Do you suppose that this was a spontaneous outbreak in your own shed?—I believe it was; I have been nine weeks occupied with it, and have had very great anxiety and trouble during those nine weeks, and I never could arrive at any other conclusion. That is the case not only with myself but with our neighbours as well.

4472. It could have had nothing to do with the ventilation, because the shed in which the outbreak took place was the best one that you had?—I believe the shed is perfect as far as it could be made so, and we had been using disinfectants, such as chloride of lime, ever since I had first heard of the disease in London. We have always used quicklime to absorb the moisture and ammonia.

4473. You think that notwithstanding this good treatment and efficient ventilation the disease broke out spontaneously?—I cannot possibly think otherwise.

4474. (*Mr. Wormald.*) When Professor Brown and Professor Simonds visited the cows that were sick did they inspect also those that were sound?—No; Professor Simonds and Professor Brown came to Golders Green, but they went nowhere near the cowsheds at that time.

4475. They did not go near the sound cows at all?—No; they never returned at all from there to the sound cows.

4476. When you use disinfectants do you apply it to the carcase of the cow itself?—Yes, to the carcase, to the floor, and even to the mangers.

4477. They were washed?—They were not so absolutely washed. They were sprinkled. We wash them now with Burnett's disinfecting fluid, and with Condy's fluid, and with chloride of lime as well.

4478. Since you have washed the cows with Burnett's disinfecting fluid have you had any attacked?—No. That is the new stock that I am speaking of.

4479. How long have you had them?—The 16th of August was the time when we bought the first twelve, but two of those twelve were attacked, not at our Golders Green Farm, but at another farm. Since then there has been no attack at all.

4480. How many have you now?—At the present time there are 54, but part of them are bullocks. I bought them in Shropshire about a month ago.

4481. Have you any belief that those disinfectants have proved of considerable service?—I really have not, because I tried them a long time before this disease broke out in the first instance.

4482. You had tried disinfectants before?—Yes, and the chloride of lime.

4483. Do you know anything about Colonel Talbot's cows?—I have superintended for him ever since he has had a farm.

4484. Are you his bailiff then?—I am not his bailiff, but I am his adviser.

4485. Are you aware that he has used disinfectants?—Yes.

4486. You know all about the treatment in that case?—Yes.

4487. Do you believe that those disinfectants in his

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case have been attended with any beneficial results ?—I believe not. The Colonel thinks they have.

4488. To what then do you attribute the immunity in his case ?—He is so isolated, and so very much further from town than we are.

4489. Then you attribute the immunity to his isolation ?—I think so.

4490. But Colonel Talbot has bought fresh stock continually, has he not ?—Yes ; but he keeps them in quarantine for three weeks before they can go near the other cows. He puts them in the farthest part of his farm, and lets them lie there for three weeks, and gets them nearer and nearer by degrees to the other cows.

4491. He is perpetually washing them with Burnett's disinfecting fluid, is he not ?—Yes, he is constantly using disinfectants. He has been doing so for the last seven weeks. I speak now of the new cows. The others he sprinkles with the fluid the same as I do, and hangs bags dipped in it about the beams of the sheds. His mode of treatment is not different from ours, only he has used rather more Burnett's disinfecting fluid.

4492. (*Dr. Quain.*) Do you believe that this disease originated in London, and in your herd, spontaneously ?—I do.

4493. How is it that Colonel Talbot has been exempted from that spontaneous origin ?—I cannot tell that. You might say, how is it that one street should be exempt from cholera while others round it are attacked.

4494. You answered a question some time ago by saying that Colonel Talbot enjoyed immunity because he was isolated ; you gave that as the reason for his escape ?—I attributed it to that, as one reason, but I do not think he is at all safe yet.

4495. You said that he was isolated, and therefore he was safe ?—I did not say that he was safe.

4496. Up to the present time he has been safe, has he not ?—Yes.

4497. Do you attribute his safety to his isolation ?—Yes ; partly.

4498. Is there not great inconsistency in attributing a spontaneous origin to the disease in your case, and at the same time saying that his safety is owing to his isolation ?—I cannot see it. I believe it is spontaneous in its origin, but most contagious on the same premises. I may mention the case of another cowkeeper who has actually issued circulars to his customers to say that by cleanliness and various other precautions he has kept clear from the Plague, and after having issued those circulars to his customers the Plague broke out among his cows a few days ago. I do not know that that will not be the case with Colonel Talbot's next week.

4499. With regard to the point upon which I was just now asking you ; if you had heard that the disease had been carried into a herd, to what would you attribute it ?—To contagion.

4500. How could you say that you were quite free from contagion when the outbreak occurred on Lord Granville's farm ?—I can only say that to the best of my knowledge and belief we were free from contagion. I believe in contagion. I am bound to do so after what I have heard and experienced. But I may mention that I have four or five neighbours, some within 40 yards, and some within 200 of me, who have escaped the Plague altogether until now, whose cows have been mixed with diseased cows and with infected herds. I have got four instances here. I have made a memorandum of them.

4501. Do I understand you to say that diseased cows have been brought amongst healthy cows, and have not infected them ?—Yes.

4502. In what stage of the disease were they ; will you make that as clear as possible ?—Perhaps I had better refer to my memorandum. The first case that I have put down is that of Mr. Tooley of North Hampstead ; he has 20 cows, and they are quite healthy. They have been driven twice a-day nearly a mile up and down a public highway, coming in contact with cattle from the Metropolitan Market, and with diseased cows going to be slaughtered ; they have grazed on an open common close to Lord Granville's farm.

4503. That you know for a fact ?—That is a fact.

4504. (*Chairman.*) You say that they have met diseased animals ; how do you know that they were diseased animals which they met ?—I know that they came from an infected shed, and were going to be slaughtered. A neighbour of mine had 105 cows attacked, and he got rid of nearly all before he let the inspector know. I saw them diseased in the Metropolitan Market.

4505. And you know that those particular cows which you have just spoken of met the herd of cattle that escaped ?—Yes ; just opposite Lord Granville's farm on the Green.

4506. Can you mention another case ?—Mr. Sharman of North End, Hampstead, has 22 cows ; they lay in a field adjoining an infected herd of Mrs. Collins's ; they broke through the hedge and mixed with them twice that he knew of. I saw him yesterday ; he has had no case of illness ; that is near to Lord Granville's farm.

4507. Do you know that that herd with which they mixed was infected ?—Yes ; it was Mrs. Collins's herd of 20 cows ; she lost 10 out of the 20 ; there are 10 still living.

4508. Those cows which were in the adjoining field had escaped, if I understand you rightly ?—Yes ; Mr. Sharman's cows broke through twice, and mixed with the others whilst they were ill. That is at North End, within 200 yards or so of Lord Granville's farm. I saw Mr. Sharman yesterday, and he gave me these facts.

4509. Is there any other similar case which you can mention ?—Yes ; a Mr. Randall of Hampstead had from 15 to 20 cows in a pasture only about 40 yards from Lord Granville's infected herd ; they are still healthy ; he has had no Plague among them.

4510. Was there any direct communication in that case ?—No ; none at all.

4511. (*Dr. Quain.*) And not one of the cattle belonging to any one of those people whom you have mentioned that you know of has had the disease ?—They have not.

4512. Not a single one ?—Not a single one. I may mention also that Mr. Claridge, of Claridge's Hotel, had 20 cows at Golders Green, only about 200 yards from Lord Granville's infected herd, and they are all well. And there is another case, which is perhaps more striking. Mr. Buckingham of Childs Hill had a new stock of cows three weeks after the old stock were dead of Plague. They were placed in the same pastures in which the diseased cows died, trod in their excrement, and only a low hedge parted them from Lord Granville's infected herd. They are healthy, all of them. That is 14 weeks ago.

4513. (*Chairman.*) How long after the last diseased cow was in the field was it that they were turned out into the same field ?—Three weeks.

4514. (*Mr. Read.*) Was not there any disinfection of the excrements ?—Not in the least ; he took no precaution ; he took no notice of it whatever.

4515. (*Dr. Quain.*) Would you consider that a prudent course to adopt ?—No ; very imprudent. I only state the fact.

4516. (*Professor Spooner.*) During the existence of the disease in Lord Granville's sheds, were you in the habit of going to Colonel Talbot's ?—Yes.

4517. And visiting his cows ?—I took the precaution to keep out of his sheds. I went to the farm, and looked after them, but I did not like to go into his sheds, hearing what Professor Simonds and the other professional gentlemen said about it. In consequence of that I did not think it prudent to go into the sheds, but I visited the farm as usual.

4518. Does the result of your experience lead you to the assumption that this is a very infectious disease, or did you merely exercise those precautions on the advice of Mr. Brown, not believing in the

infection?—To a certain extent, I believe, it is infectious. Of course I should adopt the advice of professional men in the first instance; but I do not think so much of professional advice as I did, particularly with regard to cattle. I am satisfied that professional men are very much behindhand, particularly in cattle. In horses I am satisfied with them, but not in cattle.

4519. Pleuro-pneumonia is a disease which you say is usually prevailing more or less in the sheds about London?—Yes; I do not think Lord Granville has ever been a month without it in the last four years.

4520. Have you noticed whether pleuro-pneumonia has been more or less prevalent since the existence of the Cattle Plague?—Less prevalent, I should say.

4521. You give that as the result of your own experience?—Yes; but the fact is that as soon as a cow is ill it is all called Cattle Plague now, and she is slaughtered; there is no chance for the disease to develop itself; everything is called Plague. Even Colonel Talbot, who has never suffered from Plague, has suffered from pleuro-pneumonia. He sent away two cows yesterday to be slaughtered.

4522. Do you think you could distinguish between an attack of pleuro-pneumonia and an attack of Plague in the first stage?—It is difficult to distinguish it; but I think I can distinguish it, having seen so much of pleuro-pneumonia for many years, and having had such a teaching of this Cattle Plague. Under these circumstances I think I could distinguish it. The symptoms are different. I think the symptoms of the Plague are more like those of the foot-and-mouth disease in its early stages.

5523. With regard to the treatment of the Cattle Plague, would you recommend treatment in the event of its breaking out among your animals?—I would. I treated eight myself. I had all the best advice I could get. I allowed any one to treat them who had a remedy, but they all failed except Dr. Chapman, who treated four of the cows with the application of ice down the spine, and one of those four recovered. I did not attribute it, however, to the ice treatment; it was a mild case. I treated eight with stimulants, and saved four. Professor Brown was the inspector, and he considered it quite a favour to allow us to treat them when the disease first broke out, because the Council Orders were so stringent. But he allowed me to treat some, and in one case he said, "If you cure that, it is such a decided case of "Plague we will give you a pension," and that cow is living now.

5524. You have not got your pension, I suppose?—No.

5525. What state have you usually found the bowels in in the earliest stage of the disease?—Rather constipated.

4526. Did you administer anything to correct that, or did you commence with stimulants?—I never commenced until the diarrhœa set in.

4527. You did not treat a cow suffering from constipation at all?—No; I only treated eight cows altogether, and four of them are living now.

4528. You would decidedly recommend treatment in the case of the Cattle Plague?—I would.

4529. Have you not said, with regard to pleuro-pneumonia, that you would not recommend treatment, but that you would recommend the cattle to be destroyed?—Yes, in general. I should be guided by circumstances.

4530. Then I presume you think from your experience that the Cattle Plague is a disease more easily cured than the pleuro-pneumonia?—I do not know about its being more easily cured, but the pleuro-pneumonia does not unfit a cow for human food as the Cattle Plague does. It is a business view that I take of it. If we have a beast attacked with pleuro-pneumonia worth 12*l.* or 14*l.*, if we cure the beast by treatment we diminish her value by one half before she is cured, and it takes some time to get her up to her former value again, and therefore it is better to kill her at once. With regard to the Cattle Plague it is a new thing, and I believe we were all panic-struck with it.

4531. Supposing a cow were killed which was affected with Cattle Plague in its earliest stage, would you be able to detect the fact of its being diseased by examining the meat, presuming all the intestines to be removed, and the carcase to be dressed for butchers' meat?—I believe not.

4532. In fact it would be just as valuable for human food if the animal were destroyed in an early stage of the Plague as if it were destroyed while labouring under pleuro-pneumonia, would it not?—Perhaps it would; but the Cattle Plague has had a much worse opinion formed of it. I do not know whether the meat might be as good or not. I should not fancy it as good myself.

4533. Taking a mercantile view of the case, supposing you had 100 cows, and the Plague were to affect them so that one or two of them were to die, rather than dispose of the other cows you would wait for their showing the disease, and subject them to treatment?—No; not if they were worth anything like their value to the butcher.

4534. You would dispose of them?—I would dispose of them, except in the case of a cow that was in a low condition; that is, looking at it from a mercantile point of view. If a cow was in low condition, and not worth anything for the butcher, I should incline to treat it.

4535. From what you have seen of Lord Granville's cows, and of others in your neighbourhood, what is your idea as regards the per-centage of cures out of those that have been treated?—There have not been many treated in our neighbourhood. They have been sent away indiscriminately, the whole lot together, without any treatment at all. Those cured out of the whole number of Lord Granville's would be about five per cent. only, because they were not treated. Of those that were treated the proportion would be about 20 or 25 per cent.

4536. Do you know Mr. Sweetland of Hendon?—Yes; quite well.

4537. You are aware that he has had the disease badly?—Yes, very badly.

4538. Do you know how many cows he has left out of 72?—Only about four or five; and he has been to great expense, and tried a vapour bath.

4539. Are you not aware that he has adopted a variety of kinds of treatment?—I am aware that he has adopted the treatment of the vapour bath. I do not know what other treatment he may have adopted.

4540. Are you aware of the results of the vapour bath in his case?—Not directly; only indirectly; I believe he has lost seven out of the eight.

4541. And that he has abandoned it?—Yes.

4542. (*Chairman.*) You have stated your views with regard to the contagious nature of the disease. Would you now buy cattle in a public market?—No, I would not.

4543. Why not?—Because the cows might have been in an infected herd.

4544. And that precaution that you would take would be rather founded upon your idea that the disease is contagious, would it not?—It must be contagious to a certain extent.

4545. (*Mr. Read.*) Who doctored Mrs. Collins's cows, 50 per cent. of which recovered?—The other 10 cows were not attacked. I think she had them plugged in the old fashioned way, according to the plan that was adopted when the Plague was in England a hundred years ago. They were plugged in the dewlaps. Those were not attacked, I believe.

4546. Are you quite sure that the other ten died of the Plague?—They did not all die. I think there were four altogether buried. The Inspector who attended them pronounced it to be Plague.

4547. Do you think that the plugging had anything to do with the others not taking it?—I do not think so.

4548. (*Chairman.*) Would you describe the posi-

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tion of those farms which have escaped infection relative to Lord Granville's farm?—They are just round Lord Granville's farm.

4549. There is a road or a common on one side of the farm, I believe?—Yes.

4550. Are they on the other side of the common and the road, or are they in the opposite direction?—In respect of Mr. Tooley's case, the first which I quoted, the common adjoining Lord Granville's farm is the common on to which his cows came. They came up to the front of Lord Granville's house, close to the farm.

4551. They came close to the door of the farm?—Yes.

4552. That is the communication which you alluded to?—Yes. Mr. Sharman's, the second case which I quoted, is on the opposite side at the north-eastern corner of the common.

4553. In that case there is a common and a road between Lord Granville's farm and Mr Sharman's?—Yes; but Mrs. Collins's cows were close. There was only a hedge to part them; in fact they broke through twice.

4554. They broke through on to your farm?—No; Mrs. Collins's. Buckingham's case was the fifth which I mentioned. The pasture in which he placed his cows, and in which the other cows had died of the Plague, adjoins Lord Granville's, on the south side of Lord Granville's farm. There was nothing but a hedge between them.

The witness withdrew.

GEORGE BUCHANAN, Esq, M.D., examined.

G. Buchanan, Esq., M.D.

4555. (*Chairman.*) I believe you are a Medical Officer of Health in some district in London; will you state what that district is?—St. Giles's district.

4556. You are also connected with the Metropolitan Association of the Medical Officers of Health, are you not?—Yes; I am their secretary.

4557. I suppose that the subject of the outbreak of Cattle Plague in the metropolitan district has come under your notice officially?—Yes, in both those capacities.

4558. Could you give us any general information on the subject of the origin of the Cattle Plague?—I have very little information to communicate. It appeared first in my own district rather late, although it is a central district of London. It did not appear until September, I believe. I had heard of it in St. Pancras and in Islington for some months before, and I was on the watch for it.

4559. Could you trace at all the origin of the Cattle Plague in your own district?—No. The first case occurred in a shed where there were only three cows kept, in what perhaps I should describe as being one of the best sheds in the district. It was in Bloomsbury; not in the dense parts of St. Giles's. The proprietor of the shed could not make out that there had been been any sort of communication with the diseased animals, and he had been rather strict in keeping needless visitors out of his shed.

4560. Had he made any purchases recently?—He had made no purchases.

4561. Are there many cases of cowsheds that have not been attacked in your district?—Several cowsheds have not been attacked, because all the cows had been removed as a matter of precaution. I think there is but one cowshed where the animals have not been removed, and have not suffered from the disease; and that is a cowshed in Drury Lane. It is one of the inferior sort of cowsheds, and there, as far as the statements of the proprietor are to be trusted (and I have no reason to doubt them), he has not lost any cattle by the Cattle Plague, although he has lately lost several by pleuro-pneumonia.

4562. Can you trace any reason for his immunity from the prevalent disease?—No. I tried to find out whether he had been more careful than his neighbours; but I could not discover that he had been. He had admitted to his premises people who had official business there, and had a veterinary surgeon there from time to time. I had been in them myself, and he had not asked me any questions that led me to think he took special precautions. That is in a neighbourhood where there are a good many cows.

4563. Had he made any purchases in the market?—No; he had not until a fortnight ago. He has got a little bolder now, and a fortnight ago he purchased two cattle, and a week ago another one or two. I heard from him to-day that they were all well.

4564. Did he purchase those in the Metropolitan Market or from private dealers?—He got them from a man near Barnet. He thought that was safer than going to the market.

4565. Has it been the practice of those who have escaped from the disease not to purchase in the public market at all?—I believe so. As I say, I have not had much experience of those who have escaped the disease; but it was one of the earliest pieces of advice I gave to all the cowkeepers in my district not to bring any fresh cows in, and not to go near the market if they could possibly help it. I gave them that advice as early as July, and they kept to it, I think, pretty well. There were very few, if any, new cows brought into the district; but there was a large number of them there already. There used to be from 150 to 160 in the district, and there are only between 20 and 30 now. A great many have been got rid of as a matter of precaution, while others have died.

4566. I suppose, as a rule, the medical officers of the districts are brought very much into contact with the cowkeepers in London?—Yes; their opinion is always taken. They go round to the sheds occasionally, particularly before the licensing day in September or October.

4567. As part of their duty they would visit these dairies to see that they are in a proper condition?—Yes; that is to say, to see that they are not nuisances or injurious to the public health. I think that is very much how they look at them.

4568. From your experience, what is your opinion of the condition of the London dairies at this time?—They are by no means satisfactory, but they are vastly better than they were three or four years ago, before the system of licensing was in force.

4569. At the time you refer to were they in a very bad condition?—They were then in a very bad condition; they were often over-crowded and dirty, with scarcely room for the cows to lie down in; and now they have very much improved on that; they all are drained, and they are all periodically washed, and they are ventilated more or less; I cannot say satisfactorily.

4570. What has been the apparent cause for the improvement in the condition of the cowsheds?—The system of licensing; the requiring every cow-house to have a licence. The local authorities may show cause against the granting of a licence, if they find the sheds in a bad state; and no doubt the magistrates would think right to refuse the licence if a cowshed were in a very unsatisfactory state.

4571. Was there an Act of Parliament passed altering that state of things?—Yes; the Metropolis Local Management Amendment Act.

4572. In what year was that Act passed?—In 1862, I believe.

4573. What were the particular alterations that were introduced by that Act?—Only giving the magistrates power to license cowhouses, and the local authority power to show cause against the licensing, if the local authority was not satisfied with their condition.

4574. What are the particular causes which the local authorities have to show in order that the licence may be withdrawn from a cowkeeper?—In

my own district we took wide ground about that. We tried to persuade the magistrates not to license any cowhouse at all, on the ground that they were injurious to human health, and nuisances; but the magistrates would not take that ground with us, and they licensed all the cowhouses in which gross and specific nuisances were not alleged. They licensed them at first when the question was raised, and they have licensed them in subsequent years, telling the cowkeepers that they must comply with the rules the local authority lays down.

4575. If the rules laid down by the local authorities are carried out in a locality which is not fitted for any cowhouses at all, what takes place then?—Under these circumstances, in my own district, the cowhouses are licensed; they were licensed this year in spite of another protest from myself. Seeing that the local authority would not renew its opposition, a member of our board of St. Giles's, together with myself, determined to do so. We took upon ourselves to make a representation to the magistrates, and told them again how much harm was done to public health, and in our judgment what facilities for spreading the disease among cattle were given by having the cows in London. But the magistrates did not take our view and licensed them all the same.

4576. Your inspection of course is directed to seeing that there are no nuisances which would be injurious to the public health?—That is my primary object.

4577. But in doing that of course cowhouses would be brought to your notice that were in such a state as would be injurious to the health of the cows that were in them also?—Yes.

4578. Will you hand in a copy of the rules that are in force in your district relative to cowhouses?—Yes; I have a copy here.

The same were handed in, and are as follows:

REGULATIONS adopted by the Board for the future Management of Cowhouses in St. Giles's District.

1. Every cowhouse shall be on the ground level. Cowhouses under inhabited rooms, or in immediate proximity to sleeping rooms, cannot be permitted.

2. Every cowhouse shall give to each cow a space 12 × 6 superficial feet, exclusive of gangway and channel. The cubic space for each cow shall in no case be less than 1,300 cubic feet.

3. Every cowhouse shall be well-lighted and well-ventilated, both in summer and winter.

4. The paving must be uniform, and the channels behind the cows must be of Yorkshire stone, or of sound brickwork in cement, of the width of 2 feet 6 inches at the least, sloping towards the entrance of the drain.

5. Dung pits shall be constructed of york stone sides and bottoms, set and jointed in cement, and shall be provided with proper drains. Dung shall be removed from the premises, where there are upwards of 10 cows, daily; where there are less than 10 cows, every second day; and always before 8 o'clock in the morning.

6. The sheds shall be swept and thoroughly cleansed at least twice a day, and the yard once a day. Every part of the cowhouses and yard shall be lime-whited twice in the year.

7. Every cowhouse and yard shall be provided with underground pipe drains to the public sewer, furnished with efficient traps at their entrances.

8. Every cowhouse shall be supplied with water at the highest part of the channel in each shed.

9. There shall be two covered pits or receptacles, properly drained, for the stowage of grains; or if there be one pit, it shall be divided by a partition, and each part shall be properly drained. Grains and other food shall not be kept so as to become offensive.

4579. Those are regulations adopted by the Board "for the future management of cowhouses" in the district of St. Giles's?—Yes, in 1862.

4580. What board is that?—The St. Giles's District Board of Works.

4581. In these regulations is only the health of the inhabitants near the cowhouses considered, or is also the health of the animals in the yard considered?—I do not think that we cared much at that time about the animals, provided they did not give unwholesome milk. We thought it was important to put them in the best conditions for yielding wholesome milk. I do not think we cared, when those regulations were framed, about the health of the cows in other respects. If a man incurred heavy losses we thought it was his look-out. It was for the protection of the public that we were acting. And to a certain extent we cared for the animals, because we supposed that a healthy cow would give the best milk.

4582. The first regulation is "Every cowhouse "shall be on the ground level. Cowhouses under "inhabited rooms, or in immediate proximity to "sleeping rooms, cannot be permitted." I suppose that regulation points to this, that a cowhouse, even under the best possible sanitary regulations for drainage, and so on, as regards the cows, might be in such a position as to be very detrimental to the health of the neighbourhood?—That was what we thought.

4583. The second regulation, which requires a certain space of superficial feet for every cow, would point rather, I suppose, to the health of the cow itself?—Yes.

4584. The cubic space for each cow shall in no case be less than 1,300 cubic feet?—Yes, that is the regulation.

4585. Has this Act of 1862 improved very much the condition of the dairies and cowsheds in the metropolis?—I believe so, everywhere. It certainly has in the district of St. Giles's, and I believe it has done so equally, or to a great extent, in all parts of London.

4586. I have been told by the cowkeepers in the metropolis that the system of licensing has introduced such a question of doubt as to whether they should be permitted to go on with their businesses, (that is, whether their sheds are well regulated or not,) that they have deferred a great many improvements in the cowsheds in consequence. Do you suppose that it is at all the case that they have been afraid of laying out money in consequence of the uncertainty of the tenure of their cowsheds?—I think it is possible. The cowkeepers of my district feel it a great hardship that I should oppose them year after year before the magistrates. They think that if it is desirable to get rid of them they should be bought out and sent away. With that feeling I think it is very likely that they would not do so much in the way of reconstructing their premises as they would if they felt sure of their tenure.

4587. Notwithstanding that you think there has been a considerable improvement in the construction of the cowsheds?—I am sure there has been a great improvement for all that.

4588. Do you think then that it is likely that the Cattle Plague should have originated from the bad state of the London dairies and the cowsheds; that is to say, that it should have broken out spontaneously, as we have been told it did?—No, I do not think it is at all likely, because I think they are in a better condition now, and they have been for the last two or three years in a better condition, than they ever were.

4589. (*Viscount Cranborne.*) You spoke of taking objections before the magistrates; are those the magistrates at quarter sessions?—I believe so; they are known as the Michaelmas Licensing Sessions; those are the quarter sessions, I think.

4590. I understood you to state that the regulations were enforced by the district board of works?—Yes.

4591. What is the penalty if those regulations are not obeyed?—That the cowkeeper's licence is opposed the next year.

4592. It is opposed?—Yes.

4593. But if the magistrates take a counter view to the board of works, the regulations would be entirely futile?—Quite so.

4594. In fact the regulation of cowsheds is under a double government; is it not?—Yes.

4595. Do you not think that those regulations would be more efficient if the same power enforced

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them as laid them down ?—I am not sure that they would. I think it would be difficult to get the local board or vestry to refuse absolutely to license a cowshed even though they knew it to be a nuisance; they would have just as many scruples about it as the magistrates have.

4596. Then the regulations, as I understand you, are laid down, but not intended to be observed ?—Yes ; they must be observed up to a certain point. I think that the practice of the magistrates having the power to grant or refuse a licence comes to very much the same thing as if the local authority had the carrying out of their own byelaws. I am speaking of it in practice. Of course it is not logical or reasonable that there should be a double authority in the thing.

4597. You do not think that the board contemplated the entire and complete carrying out of their own regulations ?—I think that they shuffle a good deal of the responsibility on to the magistrates.

4598. Do you not think it would be more simple if they laid down such regulations as they expected to be carried out, and then had the power of enforcing them ?—Certainly ; that would be the simplest way of doing it. Perhaps I may illustrate what I mean when I say that local authorities are apt to hesitate in giving effect to their convictions. Some local authorities at present are of opinion that cowsheds should not exist in the crowded parts of London, yet they will not use what power they have to oppose the licences before the magistrates ; they are content to tell the magistrates that the responsibility shall be on them, the magistrates; and if the magistrates choose to license them, well and good. They do not oppose them definitely. That was the case with one board, I remember, at the sessions this year.

4599. The magistrates are not composed of persons residing principally in the neighbourhood of the cowsheds, are they ?—I am afraid they are not. I wish they themselves experienced the nuisances of cowsheds.

4600. Therefore they are not persons who can be supposed to have any very acute and lively interest beyond what public feeling would inspire, in the healthiness of the cowsheds ?—Quite so.

4601. Is it your opinion that such a body as that, not closely connected with the localities in which the cowsheds exist, is the best for carrying out a system of this kind, or would you prefer on the one side a more strictly local authority, or on the other do you think that the management in the hands of the central government for the whole of London, producing thereby, a uniform system, would be more expedient ?—Certainly I should prefer a uniform system.

4602. You would prefer to place the whole system in the hands of the central government ?—Yes ; the central government of London.

4603. And that on the ground that it would produce greater uniformity ?—And greater independence of action too.

4604. It would produce greater certainty ?—Yes ; greater certainty of action.

4605. By "central government" I presume you mean the Executive Government of the country ?—No. I understood you to say the central government of London. I do not know that such a government exists, but I was assuming that it did exist ; you were putting a case, I think.

4606. Assuming that at present we are not likely to have a central government of London proper, would you prefer to be under such local authorities as we have been speaking of, or under the Executive Government of the country ?—Certainly there would be advantages in giving to the Executive Government of the country the decision whether cowhouses should be retained in London, and under what conditions.

4607. Do you think that your own duties would be facilitated if such were the case ?—I have no doubt of it.

4608. I understood you to say that what the district boards principally attended to was the effect of the cowhouses upon the character of the milk, and that they did not pay much attention to the effect of the cowhouses upon the sanitary condition of the surrounding districts ?—No ; on the contrary that is what they pay most attention to. They would, as a secondary matter, try and keep the cows in health, because they think it likely that the healthiest cow will give the most wholesome milk, but it is only as regards the effect that the cows' milk might have upon the human consumer that they would care at all about the health of the cow.

4609. It has been stated before this Commission that it would be injurious to the milk if it had to be brought every morning five or six miles from the country ; is that your opinion ?—No. I believe a large proportion of the milk is now brought up in that way.

4610. You do not think that the quality is at all deteriorated by the carriage ?—I think not, when proper precautions are taken. I know that it is constantly stated that it is so ; but I think that is for the want of knowing the minute precautions, as to cleanliness and so forth, which are necessary for carrying it.

4611. I suppose that those who furnished it might be trusted to take those minute precautions ?—Yes, they would do so in their own interest.

4612. So far then as the quality of the milk is concerned, you see no objection to removing the cowhouses from London ?—None at all.

4613. You spoke of the cowhouses being bought and sent away ; would not the sale of the premises used for that purpose in London be so profitable that buying them would scarcely be necessary ? Do you think that any jury would assess any large damages for the loss which the cowkeepers suffered in being removed to the country ?—I do not know how that would be at all.

4614. Do you imagine that they themselves would look for any large compensation ?—I do not know that either. My impression is (but it is worth nothing) that they do not expect very much, but that they would be glad if they got the value of their premises. I know that most of them would be very glad to be taken down for a railway.

4615. (*Mr. Read.*) Can you give the Commission any idea of the average mortality among the cows in your district ?—I suppose you mean in ordinary years ; it is stated variously to me ; it depends very much upon the practice in different sheds. In some sheds they practice inoculation for the pleuro-pneumonia. In sheds in which they do not inoculate for the pleuro-pneumonia I suppose from a quarter of the cows upwards, may die in the year, not unfrequently. In sheds where they do inoculate for the pleuro-pneumonia there is a much smaller mortality, I believe.

4616. If the present disease was originally generated in the London dairies, you would not have looked for the outbreak in the high and airy districts of Islington, I suppose ?—No.

4617. But rather in your own district ?—I should have supposed so, if it were generated de novo from any cause connected with the locality of London cowsheds.

4618. You think that your own district would be more likely to furnish cases of spontaneous origin than the Islington district ?—I should have supposed so ; but I do not know the character of the interior of the Islington cowsheds as well as my own.

4619. They are not generally considered worse than those in your district, are they ?—I do not suppose so, except as regards the locality in our case.

4620. I mean taking into consideration the locality, and the airiness, and so on, in that respect the cowsheds in your district would be worse ?—Yes, I think they must be worse ; they are almost all in St. Giles's parish, and in the upper part of Drury Lane, the most crowded and confined locality of all London, I should think.

4621. And yet you had none of the disease until September?—There was no case of disease till, I believe, the 4th of September. That was the first case.

4622. (*Mr. Wormald.*) Do you think that in the event of the London cowsheds being removed to the country the same kind of feeding would be followed by a better quality of milk than it is now to a material extent?—If the question is whether placing the cows in the country with the same feeding would cause them to give better milk I have no information that enables me to answer that question.

4623. Would cattle fed in the country in the ordinary way yield a better milk than that which is now produced in the London dairies; a more wholesome milk?—I should think so.

4624. It would be a better quality?—I am quite of that opinion.

4625. So that in case of their being removed from London to the country, and fed as dairy cows in the country are, there would be no essential difference in the quality of the milk?—I understand your question to mean, does the quality of the food, without the influence of London, make much difference in the milk? I should think that the way in which they are fed in London cannot be the most wholesome; it is a very highly stimulating food that is given to them, and one which is calculated to make them give an enormous quantity of milk.

4626. The object is, I believe, to obtain quantity rather than quality; and the same practice would be followed if they were removed into the country, I presume?—I presume it would.

4627. (*Dr. Quain.*) Have many cowsheds been closed since this more careful inspection has been made in your district?—No; all the cowsheds are licensed now that were licensed before.

4628. Do you know whether in the adjoining district of St. Pancras any licences were refused for sheds which had previously existed in that district?—No; I am not sure about St. Pancras; but in St. James's, Westminster, all the licences were refused, I believe.

4629. On your district the improvement has been such that you have not required the harsher measure?—No; the local authority has latterly not opposed the licences, on the ground of the cowkeepers having done a great deal towards improvement.

4630. With regard to the central body spoken of, would the Metropolitan Board of Works be in your opinion a suitable one to superintend the issuing of licences?—I should think it would be a very proper body.

4631. If the drainage, for example, and the lighting and the cleansing of the streets of London, were committed to that body, would this be a duty which you think might be properly assigned to them?—Yes; I think they would be a proper body.

4632. (*Dr. Bence Jones.*) Have you seen much of the cattle disease? Have you witnessed many cases?—Not very many. I have seen some.

4633. Had you ever seen anything like it before?—No; but then I never saw much of cattle diseases before.

4634. Have you seen much of the inoculation for the pleuro-pneumonia?—Not much. I have seen, occasionally, a cow suffering from the result of it.

4635. Do you think that many cows are saved in London by the result of that inoculation?—That is the statement of the cowkeepers. They say that they do not lose many by the process of inoculation, and that, after the cows are inoculated, they are very unlikely to get the disease in the sheds.

4636. Have you seen the process of inoculation?—I have not seen it actually done, but I have seen cows suffering from it, with their tails and the end of the spine a good deal swollen.

4637. Are they inoculated with the discharged matter from a diseased animal?—I believe they are inoculated with some of the secretion from a diseased pleura.

4638. From a dead animal?—Yes.

4639. (*Chairman.*) At the present moment you believe that the cowsheds in London are better drained and ventilated, and in a better sanitary condition, than they have been for some years past?—Yes; than they were up to 1862.

4640. Your objection to them is simply on the ground of their being unhealthy for people to live near?—Yes; that is my great objection to them.

4641. Have you any experience with regard to slaughter-houses in London?—I see something of them in my own district. The rule with regard to London slaughter-houses is, that one is attached usually to every butcher's shop, and there is no supervision of them, except to see that they are kept clean. I mean there is no supervision over the animals that the butcher slaughters.

4642. Are there any very large number of slaughter-houses in London?—A very large number; several hundreds in London altogether.

4643. Those slaughter-houses afford great facilities for people who have diseased animals sending them to be slaughtered without the inspector seeing them, do they not?—Yes.

4644. Do you think that that is a great objection to them?—I think it is. I have urged it before the Cattle Plague was talked of. I have said that there were great facilities for disposing of diseased meat in that way.

4645. You consider, of course, that it is important that there should be an early detection of any disease; and you believe that the number of these private slaughter-houses very much prevents the early detection of any contagious disease?—Yes, I do.

4646. Are those slaughter-houses under any sort of inspection?—They are inspected and licensed much as the cowhouses are.

4647. By what inspector?—By the inspector of the vestry or board of works in each district.

4648. Is that inspector the inspector of nuisances?—He is. In my own district a committee usually visits the slaughter-houses every year; and as officer of health I visit them occasionally.

4649. A committee from the district board of works visits them?—A committee of the board usually visits them before the licensing day.

4650. You do not see, I suppose, how they are conducted with regard to the slaughter of diseased animals at all?—No. One has no information at all about that.

4651. Do you think that the inspection is sufficient with regard to preventing a nuisance to the public health?—That is all that they look to.

4652. In all cases of inspection and licensing, the board of works in London act as public informers, I suppose, appearing before the magistrates in that capacity?—Yes, with a special locus standi given them by the Act of Parliament.

4653. Have you any experience of the number of animals that are sent from cowsheds in a diseased state to the slaughter-houses in London?—No; I have no knowledge of that.

4654. The number of those slaughter-houses would render it very difficult to ascertain that, I suppose?—It would be very difficult.

4655. Do you think that any public system of slaughter-houses could be established with advantage?—I think it would be very desirable indeed that we should have public slaughter-houses.

4656. Do you think it would be practicable at present, considering the large consumption of meat and the enormous extent of the town?—I think it would be quite practicable, with the facilities of communication that exist.

4657. Have you ever prepared any scheme in your own mind for establishing public slaughter-houses?—I have a rough knowledge of how the meat trade is carried on in some large towns, where a system of public slaughter-houses is in operation, the Paris system, for example.

4658. How would you apply that system in London?

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I should imagine that there might be a certain small number of abattoirs round the metropolis in connexion with the railways leading into the middle of the town, and that animals coming from the country could be stopped there, and their meat sent on into London.

4659. Supposing you maintain the present system of a live meat market in Copenhagen Fields, would you be able to carry out the same system?—If you mean in connexion with the market, I suppose you might; but I have not considered the existing arrangements to see how they should be worked into a system of that kind.

4660. Would you be in favour of stopping all live stock coming into London?—I think it would be a great advantage.

4661. Where would the market be for the metropolis for dealers in fat cattle and butchers' meat?—It does not appear to me that it is needful to deal in live fat cattle within the metropolis.

4662. You would have the butcher purchase of the breeder or feeder of stock in the country?—I suppose there would be an intermediate agent then, as now; but I am afraid that I cannot help you very much as regards the details of the trade.

4663. Can you state the number of slaughter-houses there are in your own district?—I believe there are 13 or 14 in our population of 50,000 people; that would give a good many hundreds to the whole population of London.

4664. (*Mr. Read.*) It is a very easy matter, then, I suppose for a diseased cow to go into a slaughter-house and be killed without any one's seeing anything of it?—I should think nothing was easier.

4665. A live stock market just outside London would under any circumstances be necessary to supply this city with meat?—Yes; just outside London I suppose it would. I was not contemplating that the abattoirs I spoke of should be far off.

4666. (*Chairman.*) Have you any information as to the movement of the cows in dairies?—I find that it is customary to get rid of cows, if they are ceasing to give a very large supply of milk. That it is most profitable to the dairymen to have cows which are furnishing them with the utmost supply of milk, and to get rid of them immediately they begin to give less. Therefore if a London cowshed contains 50 cows, it is probable that another 25 will pass through that cowshed every year; sometimes I daresay as many as 50 others will pass through that cowshed in the course of the year. That is the case merely from the new cows being brought in in full milk, and from the old cows being taken away because they are not giving so much milk.

4667. In that way, I suppose, if there is any disease in a cowshed it is very rapidly communicated to the market?—So I should believe.

4668. I see there are some rules in this paper with regard to the dung pits and places for manure attached to the cowsheds. What generally becomes of the manure?—It is kept until there is a certain quantity of it, and then it is taken away, according to those rules pretty well.

4669. Since the prevalence of the Cattle Disease, do you suppose that those dung-heaps have been properly disinfected?—I do not suppose they have.

4670. I suppose, as a rule, we may gather from what you have told us, that the cowsheds in the metropolis are well drained and well supplied with water?—Yes, that is the rule, certainly.

4671. (*Viscount Cranborne.*) Does your inspection include the butchers' shops?—Yes; I inspect their slaughter-houses, which are in connexion with their shops. In my district the slaughter-houses are all in connexion with the butchers' shops.

4672. Do you seize bad meat?—Yes, I believe I should have authority to do so if I came across any, but I have never come across any bad meat.

4673. From which it may be inferred that bad meat very seldom comes into your district, I presume?—Or that I am not very alert in looking after it.

4674. But I presume you would see it if there were any bad meat there?—Yes; if it were very recognizably bad meat.

4675. You have no knowledge then as to the amount of time for which, speaking strictly from a sanitary point of view, it could be kept?—Do you mean under the worst circumstances of weather?

4676. What I rather wished to ascertain was whether you had constructed any formula in your own mind, however roughly, arranging the time for which meat could be kept, according to the temperature of the season?—No, I never have; I imagine it would depend very much upon the methods of packing, and the methods of conveying the meat.

4677. Assuming those to be at their best, are there any scientific data for deciding the length of time during which meat can be kept in reference to the temperature and the season?—I should think it would be easy to get such data, but I do not know that they exist.

4678. Are there any indications scientifically established by which you can tell at once whether meat would be injurious for food or not?—I believe not.

4679. It is a very vague judgment in each case that you must form?—There are some diseases in which you could tell at once that the meat would be injurious if used for food.

4680. But there is a very large intervallum?—I believe so.

4681. I presume then, from your answers, that this matter has not been made the subject of special scientific study?—I believe it has not yet sufficiently.

4682. (*Chairman.*) Have you any other information that you think would be useful to the Commission?—I fear there is no other point upon which my experience is of any value.

The witness withdrew.

Mr. Thomas Poynton Dexter examined.

Mr. T. P. Dexter.

4683. (*Chairman.*) I believe you have a large cowshed in London?—I have.

4684. Are you connected in any other way with the cowkeepers of the metropolis?—I am the chairman of an association of them.

4685. What does the association consist of?—Our object has been mutual protection principally.

4686. Against losses by disease?—No; not against losses, but merely for the purpose of meeting together in order that in any emergency we might adopt measures in concert.

4687. In what kind of emergencies?—We formed our association just when it was first rumoured that the licensing system would be adopted, and when an agitation was started against keeping cows in London, our object of course being to retain the cows.

4688. Have you many members belonging to your association?—Not very many; from 30 to 40.

4689. You are in pretty constant communication with other cowkeepers, I suppose, in the metropolis?—I am.

4690. Can you give us any information as to the outbreak of the Cattle Plague in London?—The first case I knew of was that of Mrs. Nicholls of Islington.

4691. You have not been able to find out any earlier cases than that, in Lambeth or elsewhere?—I have not.

4692. Do you believe that the Cattle Plague had its origin among the cowsheds in London?—I do not.

4693. What is your reason for holding that opinion?—I believe it was brought from abroad; at the time that I heard of its appearance from the communication of friends, I was led to believe that that was the case.

4694. What is the condition of the cowsheds in the metropolis generally?—I think generally good.

4695. They are generally well ventilated and well

drained?—Generally they are well ventilated, and kept exceedingly clean. There is much more attention paid to cleanliness than in country places.

4696. How comes that to be the case?—Because we find it necessary, and we employ more labour proportionately.

4697. Can you tell us what is the ordinary mode of managing a dairy in London with regard to keeping up the stock, and so on?—We generally buy animals, and bring them in just after calving, and keep them as long as they milk sufficiently to pay us. By the time that they have ceased milking sufficiently they are generally fat enough for the butchers.

4698. You do not attempt to breed in a dairy?—No; we never breed.

4699. Is the feeding very different from the feeding of cows in an ordinary country dairy?—I think the only difference is the use of the brewers' grains in London. In other respects I think that our feeding is very closely like that adopted in the country generally; in fact grains are being used now more in the country than they were.

4700. What is the effect of that particular feeding on the milking qualities of the cow?—A cow will give more milk by the use of the grain.

4701. Do you consider the quality of the milk produced by the London cows at all different from that coming from country dairies?—We have not much opportunity of judging. We find, however, that when we have milk from the country we cannot get cream from it. Our milk will throw much more cream than the country milk.

4702. How do you account for that difference; does it arise from the mode of feeding the animal, or from the shaking that the milk gets in its passage to London?—I think probably both. From what I have seen of the country milk and the London milk myself I judge that our London milk is richer in cream, but theirs is richer in curd.

4703. What effect has the particular feeding in the London dairies upon the constitution of the cows; do you suppose that they take a disease more easily than cows in a country dairy?—If they are overfed, as they are by some of the London dairymen, I believe that they are more susceptible of disease. I believe that some of the London dairymen do overfeed their stock, and consequently do render them more susceptible, but I think otherwise they are not so; that is to say, if they are but moderately and fairly fed.

4704. Do you think that there is more pleuropneumonia, or foot-and-mouth disease, in the London dairies than in the country dairies?—From reports that I have received I should say decidedly not.

4705. Has not the constant change of stock, involving a constant buying of fresh cows, in the London dairies, some effect upon the health of the animals?—Of course that exposes us to greater danger, but that would apply to a country farmer who kept stock for the London trade. Any country cowkeeper that sent his milk to London would be liable to it, because he would be placed just under similar circumstances to ourselves.

4706. You are alluding to dairies in suburban districts like Willesden and Hendon, I presume?—No; of course at the present time milk is being sent up from all parts of the country to London, and whenever a large quantity is being sent up to London, and contracts are entered into for the regular supply of milk, the cowkeeper is placed in the same position as we are, because that supply must be kept up by the addition of fresh animals from time to time, and those must be obtained where they can.

4707. Has there been much change in the condition of the London dairies in the last few years?—For some years past there has been a gradual improvement, but I do not think it has been particularly marked in the last few years.

4708. What has been the effect of the licensing system upon the London dairies?—I should be disinclined to ascribe much influence to it.

4709. Has not that system done away with a good many, particularly ill drained and dirty sheds?—Not to my knowledge.

4710. Are you opposed to the system of licensing? I am; because I consider that instead of offering an incentive to improvement in the sheds it puts a very serious obstacle in the way of such improvements. No man will be willing to lay out money upon property unless he feels that he is secure in the possession of it; and when conscious that he may be deprived of his shed from year to year he feels the tenure so precarious that he will not lay out much upon it.

4711. But I suppose as long as a cowkeeper complies with certain sanitary regulations he is pretty sure to get his licence, is he not?—I do not think so. I know Mr. Thrupp stated that he considered the licensing system designed to do away with the sheds in London gradually, and therefore, acting upon that principle, he considered that if objection was raised against a shed a justification was supplied for removing or rather withholding the licence. Consequently the licensing system renders us subject to the caprice of a few, and open at any time to such opposition as shall deprive us of our licence.

4712. Would there be any great hardship in doing away with the London dairies?—It would tell very unequally. In some cases I believe that the hardship would be very slight; in others, where, for example, a man has laid out a considerable sum of money upon the premises, and where they are comparatively useless for any other purpose, the hardship would be great.

4713. Could the trade be carried on without London cowsheds?—That is a question which it is very difficult to answer. I should scarcely be prepared to say that it could not, but I believe that there would be a very great amount of inconvenience attending it.

4714. How so?—In the first place, if you have all your milk from the country you necessarily have that milk twelve hours old before delivery. For instance, the milk delivered for breakfast in the morning is that milked over night, and the milk delivered in the afternoon is that milked early in the morning. Of course in the winter months that is a matter of little or no consequence, but in the summer months, in the excessively hot time of the year, it is frequently attended with inconvenience; the milk is sour before it is delivered.

4715. Whom do you go before to obtain your licence now?—The justices at petty sessions, I believe.

4716. Are they the petty sessions or the quarter sessions?—I believe they are the petty sessions; but that is one of the licences (*producing a paper*).

4717. What is the usual number of the magistrates who form the tribunal before whom you go?—Two or three; two very often.

4718. Is there any constant rule which they apply to the granting of licences?—If there are no objections taken, the licences are granted as a matter of course; they have been granted hitherto, if no exception is made.

4719. Who generally take the exceptions to your licences?—The exception may be taken by the vestry through the medical officers or the sanitary inspector, that is the inspector of nuisances, or of course any parishioner or any resident in the neighbourhood may raise an objection.

4720. And they are refused on two grounds, either that the locality is not fitted for any cowsheds at all, or that the cowsheds in the locality are not kept clean and in proper order?—I suppose that would be the ground assigned, but I do not think the magistrates are required to assign any reason for withholding a licence.

4721. Do you mean that it would be sufficient for one of your neighbours to go and complain of your cowshed without stating any grounds, and that then

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the licence would be withdrawn?—No; of course the neighbour would have to make some complaint.

4722. (*Mr. Read.*) And to state the grounds of the complaint?—Yes.

4723. (*Chairman.*) Then would you prefer some other tribunal to the present petty sessional division of magistrates before whom you go?—I think myself it would be better vested in the hands of the vestry than according to the present plan.

4724. Why would you prefer that body?—Just for this reason, that I know that many of the justices have strong personal prejudices in the matter, and I think that it is scarcely fair that the interests of a large class should be placed without any power of appeal in the hands of one or two individuals, because it is not a question of law that has to be decided.

4725. You do not object to the principle of licences in general, supposing that they were tried by a fair tribunal, and on fixed principles?—No, I do not; in fact I think that under those circumstances they would operate well.

4726. (*Viscount Cranborne.*) Who are the three magistrates who licensed you; are they resident in the neighbourhood?—I suppose so.

4727. Do you know anything about them?—Mr. Thrupp is well known; he was the chairman when I was licensed. I do not know him further than having seen him there.

4728. Do those three gentlemen always sit upon the same petty sessions, or are there a large number of persons out of whom they are accidentally selected?—Mr. Thrupp has been there on each occasion; and this morning before coming here I looked at my licence, and I find that Mr. Cotterell has been there, I think, on each occasion; I think that is the gentleman's name; his name is signed each time to the paper; but Mr. Thrupp is the principal person, evidently.

4729. You do not know at all where they reside?—No, I do not; of course I have never had the least occasion to inquire.

4730. Have they laid down for you any set of rules or regulations by complying with which you could secure the continuance of your licence?—The vestry require of us certain conditions without complying with which we cannot retain our licences.

4731. Have the vestry the power of taking your licences from you?—No; all they can do is to oppose before the justices.

4732. Then if Mr. Thrupp does not agree with the vestry these regulations would not be carried into effect?—They have the power of objecting, but I believe that Mr. Thrupp has the power of decision entirely, or, rather, I should say, the magistrates generally, not Mr. Thrupp alone.

4733. I understand that the board of petty sessions have laid down no sort of conditions or rules by which you are to guide yourself for the purpose of retaining your licence?—They have not; the vestries have.

4734. Have the petty sessions formally accepted the rules of the vestry?—I suppose so.

4735. But you do not know that they have?—I do not know it. I take it for granted, because, of course, they have made no others.

4736. Is not your present position rather a precarious one, under these conditions?—We think so; we quite recognize that.

4737. Should you not prefer some final and definite decision of the question, whether you were to have the right to live in London or not?—Of course we should, because we know that it is the impression of many of these magistrates themselves that the design of this licensing system was to drive us out of London gradually.

4738. I suppose you would rather he driven out at once than gradually?—We should; because it would be much fairer and more just to make one measure affecting us all than to strike one man off to-day and another to-morrow, thereby giving an unfair advantage to the remainder as long as they stopped.

4739. It is not a very creditable way of dealing with any class of persons to attack them upon another pretext, when really it is desired to remove them from the district altogether; is that your opinion?—We think so; we quite recognize that.

4740. But then supposing you were removed there would be large questions of compensation to be settled, I presume?—There has been no question of compensation hitherto; sheds have been taken again and again, and of course no compensation made for them.

4741. You mean that if a licence is refused to you, you have to go, and without compensation?—If a licence is refused, it is no matter what we have expended upon the premises; those premises have been practically forfeited for the purposes for which they were erected; it is no matter how long they have been held; no compensation is given for them.

4742. Therefore an actuary would not estimate at a very high amount the value of your tenure of your cowsheds at the present moment?—Of course not. In reality there would be very little claim for compensation with regard to the premises, I should say. I am not speaking now of exceptional cases, but in many instances the premises, would be available for other purposes; for instance, I have let my own sheds, or rather I believe I have. I am in terms now with a gentleman to let them to him to convert them into stables.

4743. In the majority of cases you think that a similar use could be made of the premises?—Yes; of course they have become more valuable now for other purposes than for sheds.

4744. I suppose that in all cases the cowkeepers would be contented to submit their claims to the consideration and the decision of a jury?—Yes; I think so.

4745. I understood you to say that the milk delivered in the morning in London, having come from the country, was the milk that was taken over night; is it not the case that the milk comes in at four or five o'clock in the morning by railway trains?—Very rarely; at any rate not from any considerable distance. I know that if you were to go, for instance, to any of the stations at from 10 to 11 o'clock at night you would see what a quantity of milk is brought there. That would show you that by very far the larger quantity, I may say in fact the whole of it, with very slight exceptions, comes up overnight.

4746. (*Mr. Read.*) Do I understand you that when a licence is taken away from an occupier of a shed it is never renewed to another occupier of the same shed?—I think not.

4747. What does your licence cost you?—Only 5*s.*; the cost is merely nominal.

4748. Is that paid in fees?—I do not know; I suppose that there is no fee with it; there is just a charge of 5*s.* The Act requires that it shall not exceed 10*s.*

4749. Is it possible greatly to increase the quantity of milk from a cow without at the same time deteriorating its quality?—I believe it is.

4750. Would you tell me how?—By feeding; but I believe that that system cannot be long continued without injury to the animal.

4751. Now will you tell me how I could produce more milk and consequently more butter from my dairy of cows?—Of course that depends just upon how you feed them at present; for instance, the London cowkeepers generally feed freely upon oil cake, upon barley flour, or something of that kind, and upon grains and wurzel and hay. I think that those things given freely do decidedly produce a larger quantity of milk, and without deterioration of the quality of the milk.

4752. Is it not your interest to produce a larger quantity of milk rather than regard the quality of it?—No; that has its limit. If our milk was below a certain quality it would not give satisfaction.

4753. But your object is to produce milk rather than butter or cream, of course?—You probably know

that in certain localities there is a very large demand for cream ; for instance, at the West End.

4754. Does not that cream mostly come from the country ?—There is very much produced in London as well. There is a good deal that comes from the country.

4755. More cream in proportion than milk comes from the country, does it not ?—Not now ; that used to be the case, but it is so no longer. Of course there is but little cream required comparatively in London at the present time. The chief demand for cream is from something like April or May to the end of the season. At other times there is not a very large demand.

4756. Previous to the Plague there was more cream from the country in proportion to the milk, I suppose, than from London ?—Yes.

4757. (*Dr. Quain.*) How many cows had you in your establishment immediately before the Plague ? What was your usual average ?—My usual average was about 40 ; but that was just at the end of the season, consequently I had reduced my stock then to 32.

4758. Have you had the disease among your stock? —I have.

4759. What is the number of your stock now ?—Two.

4760. Have you thought of replacing those you have lost ?—No, I have not.

4761. Do you think of replacing them again ?—I do not think it is likely that I shall.

4762. If the trade in cows and cattle were suspended by Government for three months, and people were prevented from moving cattle, would that be a great hardship to the London cowkeepers ?—I believe it would.

4763. I say for the next three months ?—Yes. I do not mean so much for their buying as for the interruption that it would give to those by whom the supply of milk is kept up.

4764. If you were prevented from buying cattle, and bringing them up to replace your losses, for the next three months, would that be a very serious hardship ? I speak of London only now ?—Perhaps not very great. I am scarcely prepared, however, to answer the question.

4765. Were you present at a meeting of cowkeepers held at Chelsea lately ?—I was.

4766. Did you agree with the opinions expressed there ?—Yes ; I was one of the speakers.

4767. Do you differ from those opinions now ?—No ; perhaps we do not properly understand your recommendation. If you merely recommend the suspension of the trade in London, that is one thing ; but if you recommended a general suspension of the trade throughout the country, which we understood, that is a very different thing.

4768. How would the general suspension of the trade throughout the country affect you ?—Most seriously, by its effect upon those who are now supplying us ; for instance, I am supplied principally by a farmer at Petersfield, who is supplying not only myself but several others. Now, in order that he may keep up the quantity of milk which we require, he must be buying cows not only monthly but every week, and consequently, if you stop him, you affect us, because if he does not get his quantity of milk of course he cannot give us ours.

4769. Could not those cows supply the milk to other persons, so that you would get it from other sources than those from which you are now supplied ? —You must remember that the more sources we are supplied from the greater the expense involved ; and there is another thing to be considered ; we do not so much care about having milk from strangers, because, unless they have been somewhat accustomed to the business, the probability is that they will send it sour.

4770. Then it is merely a matter of inconvenience to some extent, and that for a limited time ; there would be no serious difficulty ?—I believe that that inconvenience would be so great as to present a serious difficulty to us. You will understand that if we are not able to supply our customers with the quantity they require they are generally indisposed to make very many inquiries upon the subject. They go elsewhere if they see that they can be better supplied.

4771. If the Plague were allowed to continue amongst the cattle, in consequence of this movement of stock, would it not be a still greater embarrassment and a greater inconvenience to you and other cowkeepers ?—If what you have suggested were the only means by which the Plague could be arrested, I admit that it would be the smaller evil of the two ; but I think for one thing that any such regulation would be to a very great extent inoperative, because it would be so much evaded.

4772. Do you think that it would be evaded if it were said that no cattle whatever should be moved ? —I do.

4773. How could it be evaded ; it would be a general prohibition against moving cattle ?—I am afraid it would be found that it could be evaded.

4774. Has any method suggested itself to your mind by which the progress of the Plague could be arrested ?—My own opinion is that more ought to be attempted in the way of treatment.

4775. Would not the present be a more convenient time than any other to get rid of the cowsheds from London ?—I think it would while they are so empty. I admit that. I do not deny it for a moment.

4776. (*Chairman.*) Does your association insure the cows belonging to the cowkeepers ?—No ; they do not.

4777. Do you know of many cases in which your friends having cowsheds in London have escaped the disease ?—I know of some cases ; several cases indeed.

4778. Can you trace any reason for their immunity from the disease ?—I cannot at all. I am utterly at a loss.

4779. Have they bought in the market like their neighbours ?—I believe so.

4780. You have not made that a special subject of inquiry ?—I know they have had fresh cows in.

4781. Within the last few weeks have you had any meeting of your association to discuss these points ? —We have not.

4782. The answers that you have given, therefore, do not represent the views of your association ?—No ; they do not ; they are purely personal.

4783. Is there anything that you wish particularly to draw our attention to ?—I think not.

The witness withdrew.

Adjourned.

Thursday, 7th December 1865.

PRESENT :

Earl Spencer.	Dr. Quain.
Viscount Cranborne.	Dr. Parkes.
Mr. Lowe.	Mr. Ceely.
Mr. Read.	Professor Spooner.

EARL SPENCER in the Chair.

Edward Holland, Esq., M.P. examined.

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4784. (*Chairman.*) I believe you have taken considerable interest in the diseases of cattle ?—I have.

4785. Will you state what reasons you had for introducing a Bill in the year 1863 on the subject?—Perhaps you will allow me to read an extract from a paper which I produced at Edinburgh in 1863 before the Social Science Meeting. I have read it over since I received your summons, and I am still of the same opinion that is expressed there. Perhaps that paper will explain my opinion most satisfactorily. I will only read a portion of it. "I believe that much "good would ensue from the appointment of an "Inspector General of live stock traffic throughout "the United Kingdom. His duties should be to "collect trustworthy information as to the health of "stock, whether imported from abroad or circulating "in the home trade. He would have to keep himself "in communication with the different inspectors of "towns, fairs, and markets throughout the country; "to visit different localities; to give attention to the "reports of outbreaks of disease, and more especially "to the spread of contagious disorders in all countries "from which importations are made to this. It would "be the duty of such an inspector to investigate "special outbreaks of disease, with a view to determine "the causes producing them, and he could suggest to "the Privy Council proper measures to arrest the "progress of such disease; and whilst in communi-"cation with local inspectors, and adopting with them "special precautionary measures against the propagation "of disease should it appear in any district, he would "report to the Privy Council what steps ought to be "taken on the occasion. Besides, he should report "annually on the diseases of animals in the United "Kingdom. Such a report would enlighten farmers "as to the best means of protecting their stock in "health, and would directly lead to a great diminution "in the traffic of diseased animals. But here exists "another difficulty: Who are to be the inspectors? "Are they to be, as they too frequently are, at present, "unqualified men for the office, chosen frequently "through corporate interest rather than on account of their veterinary knowledge; or are they to be well educated, scientific, veterinary practitioners? Indubitably they ought to be the latter; but where are "these to be found? My belief is that from the want "of a high grade of education amongst professional men "the farmer has taken up the impression that medical "treatment could do nothing for him; that spending "money in attempting to cure his diseased animals was "a farce; and hence he has had further inducement "to send his sick animals to market whilst life was "still in them. Had there been in existence a suffi-"cient number of well-qualified veterinary practitioners "he would have acted otherwise, and not have in-"curred such serious losses as he has done through "the dissemination of contagious and infectious "diseases. Statistical returns up to the present "time" (this is dated in 1863) "show that the number "of members of the Royal College in practice in the "United Kingdom is only 1,018, whilst the number "of those who assume the title of veterinary surgeon "is 1,244, and those practising as farriers 1,109, "The number, 1,244, who unscrupulously assume the "title of veterinary surgeons, which the possession "of the diploma alone ought to confer, affords a "striking proof that the profession requires legisla-"tive support. It is expedient that persons requiring "veterinary medical aid should be enabled to dis-"tinguish the qualified from the unqualified practi-"tioner, and it is a gratification to know that a "measure is to be brought next session before Parlia-"ment, having for its object the punishment of such "persons as shall wilfully or falsely take or use the "name of veterinary surgeon, and practise under that "title without being duly qualified to assume it. At "the same time the framers of this Bill have taken "care that it shall not be retrograde in its action; "and that its provisions shall not affect any persons "actually practising as veterinary surgeons previously "to October 1864." I have here a copy of the intended measure which I was then about to bring into Parliament. I could not bring it forward, however, as I had no chance of being successful with it; and in the Bill which I have here now the word 1866 is introduced. "Upon a more perfect system of inspection, "both at our ports and in our markets, and upon a "wider spread of scientific professional knowledge, do "I rely for improvement in the quality of food supplied "to consumers, for a diminution of sickness and death "arising from the consumption of diseased meat and "milk; and further, to the same sources, do I look for "a diminution of the immense losses incurred by "farmers and graziers through slaughtering for food "instead of attempting to cure their diseased animals." This paper was read before the Section of Health at the Social Science Meeting at Edinburgh. It was more in connexion with diseased meat that the question was brought forward than anything else. I then attempted to introduce a Bill in the next session, called "The Cattle, Sheep, &c. Contagious Diseases Prevention Bill." Sir William Miles joined me in bringing it forward, and our names are on the back of the Bill. In this Bill we tried to introduce a clause with regard to the inspection providing that the Privy Council should appoint an Inspector General. His powers and duties are stated in accordance more or less with what I have read. He is to be subject to the Orders of the Privy Council; and there are certain penalties and so forth connected with preventing him or interrupting him in the discharge of his duties. That Bill I was obliged to withdraw; but I only withdrew it after Government had promised to bring the question forward the following year, which they did. I have here the Bill which was brought forward in the following year. It was prepared by Mr. Bruce and Sir George Grey. It is called "The Cattle Diseases Prevention Bill;" but even Government, with all their strength, were obliged to withdraw it, after a very long sitting in Committee. I have a copy of the Bill, which I can leave with you, if you wish it; and I have also brought the proposed Bill for the improvement of the position of the veterinary surgeons. The clauses of that Bill are, first of all the short title, then the commencement of the Act, and then a penalty for falsely using the title of veterinary surgeon; then the exemption of all persons in practice prior to the 1st of October 1864; and recovery of the penalty. I have now prepared something of the same kind to bring forward in the next Parliament. It will be a Bill to the same effect, only exempting all persons in practice prior to the 1st of October 1866; the clause running thus:—"Pro-"vided nevertheless, that this Act shall not affect "any person who shall prior to the 1st day of "October 1866 have assumed the name or title of "veterinary surgeon, and at the period last-men-"tioned shall be actually in practice as such." The

object of the Act is, that "any person, not being a "member of the said Royal College of Veterinary "Surgeons, who shall after the time appointed for "this Act coming into operation take or use the "name or title of veterinary surgeon, or who shall "falsely represent himself to be a member of the said "college, or who shall use any other name or title, "with intent to lead or whereby the public may be "led to believe that he is a member of the said "Royal College of Veterinary Surgeons, shall upon "a summary conviction for any and every such "offence pay a sum not exceeding 10*l.* nor less than "5*l.*"

4786. At the present moment there is no penalty for an unauthorized person practising the veterinary science?—I am not aware of any. There certainly is none for practising.

4787. (*Mr. Lowe.*) Nor is there any in medicine for practising upon human beings, is there?—I was not aware of that; I thought there was.

4788. (*Professor Spooner.*) I have no doubt you are well acquainted with the nature of the charter granted to the Royal College of Veterinary Surgeons in 1844?—Yes; I have it here.

4789. Will you have the kindness to read the preamble of that charter wherein it sets forth that all persons who have undergone a certain examination shall be entitled, exclusive of all others, to call themselves veterinary surgeons?—This charter recognizes the veterinary art to be a profession. The words are these:—"And we do further declare and grant that "the veterinary art as practised by the members of "the said body politic and corporate shall be hence-"forth deemed and taken to be and recognized as a "profession, and that the members of the said body "politic and corporate, solely and exclusively of all "other persons whomsoever, shall be deemed and "taken and recognized to be members of the said pro-"fession, or professors of the said art, and shall be "individually known and distinguished by the name "or title of veterinary surgeons."

4790. There is no penalty of course upon that?—No; there could not be.

4791. (*Chairman.*) In improving the law with regard to contagious diseases among cattle, what would you rely upon besides improving the veterinary science of England?—At present there is no confidence whatever in a veterinary surgeon, because he is so frequently an uneducated man that we have nothing to rely upon.

4792. In your Bill you propose some new clauses with regard to the removal of infected animals, and with regard to markets where animals are exposed; I believe?—Yes; I rely upon the inspectors for that. I may state that the inspectors have very much improved during the last two years. When Government found that they could do nothing with this measure that I have spoken of they strengthened their hands by making an alteration in the Nuisances Removal Act, which rendered the clauses referring to markets more stringent.

4793. Do you think that that has been sufficient?—No, it has not been sufficient; because, although a great many of the inspectors are very much improved, and are very good men, yet there are others that are the mere creatures of the corporations.

4794. What new system of education would you propose to institute in order to improve the class of veterinary surgeons?—They might take advantage of the present education. They might be required to take a degree, and then they would become educated men, which at present they are not.

4795. Then you would not permit any person to practise the veterinary science without having a licence from certain named colleges?—I should say without having taken a degree.

4796. Where would he have to take his degree, according to your proposal?—At the colleges which are at present established.

4797. At the existing colleges?—Yes.

4798. You consider that the education given at the existing colleges is satisfactory?—Yes; our best veterinary surgeons come from those colleges. Certainly they may be improved.

4799. And, as far as inspection goes, wherever an inspector is employed who has been educated at one of these colleges, do you consider that satisfactory?—It does not always follow that he has been educated at one of these colleges. He is not always a veterinary surgeon.

4800. When the inspector is a veterinary surgeon who has been educated at one of these colleges, do you consider that the inspection is satisfactory?—Yes, certainly.

4801. You consider that the examination which it is necessary to pass in order to become a member of the college is satisfactory?—Yes; on the whole. It might be improved very much; it is improving now.

4802. Then your great object would be to prevent people practising who have not received an education at one of these colleges?—Yes; exactly.

4803. At present then you do not consider that there is a sufficient supply of these qualified veterinary surgeons?—Certainly not. I forget at this moment where I got these figures which I stated in 1863, but I see it is from some statistical return; however, those figures show what a great number there are who are not qualified men.

4804. (*Professor Spooner.*) When in answer to the noble chairman you say that you would prevent all persons from practising the veterinary art who are not members of the existing colleges, I apprehend that you mean that you would prevent their practising under the title of veterinary surgeons, they not being entitled to call themselves so?—If it so happened that there was a great demand for veterinary surgeons, and if another college was established, if that college had its charter from Government as well as the existing colleges, and if it were a duly established college, I do not see why it should not give degrees likewise. I do not confine myself to the existing colleges.

4805. But you do not mean to say that you would prevent any persons from treating the lower animals, although they may not have studied at either of those colleges, presuming they did so under some other title, such as "cow leech" or "farrier;" what you mean is that they shall not assume the title of veterinary surgeons; is not that the case?—I mean that each man should have a diploma.

4806. Do you mean to say that it should be penal on the part of any man to practise in the treatment of the disease of the lower animals not having a diploma?—I think it ought to be so.

4807. That would be carrying it to a much greater extent than the veterinary surgeons anticipate, would it not?—What we want is, a well-educated professional class of men to attend to our cattle and horses.

4808. Is not what the veterinary profession requires this, that no persons practising on the treatment of the lower animals shall assume the title of veterinary surgeon if they have not been educated at one of the recognized schools?—Yes.

4809. You do not think for a moment that Parliament would pass a bill to prevent persons from practising upon the lower animals without such diploma, if the public thought proper to employ them?—Our great object is to get well qualified and professionally educated men.

4810. Is it not the object of the agriculturists to guard against imposition?—Yes.

4811. That is to say, to guard against imposition by a person assuming a title for which he is not qualified?—Certainly it is.

4812. That is the object of the Bill of which you have spoken?—Yes.

4113. But the object is not actually to prevent any man from practising?—No; that clause that I read to you is to the effect that "any person, not being a "member of the said Royal College of Veterinary "Surgeons, who shall, after the time appointed for this "Act coming into operation, take or use the name or "title of veterinary surgeon, or who shall falsely re-

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" present himself to be a member of the said college, " or who shall use any other name or title, with intent " to lead or whereby the public may be led to believe " that he is a member of the said Royal College of " Veterinary Surgeons, shall upon a summary con- " viction for any and every such offence pay " such and such a sum.

4814. That is for assuming the title of veterinary surgeon ?—Yes; and then the 4th clause of this Bill is introduced because there are a great many persons who are in practice now calling themselves by some title, making the public believe that they are veterinary surgeons by education. The clause runs thus:—" Pro- " vided nevertheless, that this Act shall not affect any " person who shall prior to the 1st day of October " 1866 have assumed the name or title of veterinary " surgeon, and at the period last mentioned shall be " actually in practice as such."

4815. Then do you think that such a Bill as that would effect the object that the veterinary surgeons have in view, that is, to prevent persons practising as veterinary surgeons, and calling themselves veterinary surgeons, who really are not so ?—I think it would improve the state of things very much.

4816. Would it not give an opportunity to any man, whoever he may be, to set up with the name of veterinary surgeon prior to the Bill being passed, presuming that it is passed ?—That would be just as he does now.

4817. I will take the case of all my grooms at the college, prior to the Bill passing, knowing that such a Bill was likely to be obtained, might they not all of them put over their doors " veterinary surgeon," and still continue to practise under that title as far as the proposed Bill is concerned ?—Yes.

4818. Do you not think that in the event of such a Bill being obtained it would be right that it should apply to all such persons as have assumed the title of veterinary surgeon since the obtaining of the charter of 1844, because the charter distinctly sets forth that persons who have been educated at such and such schools, and passed through such and such colleges, shall be, exclusive of all others, entitled to the use of that name ?—Yes; but I think that by this measure we meet all those cases of men who have not been educated in that way, and who nevertheless assume this title.

4819. You do not think then that the Bill which you say you are about to introduce into Parliament ought to apply to those parties who have assumed the title without having been to any of the colleges ?—I think it does apply to them.

4820. You do not think that it should apply to any of those parties, though they may have assumed the title subsequently to the granting of the charter ?—I think it applies to all who have not got a diploma.

4821. It would only apply to those who shall have entered the profession after the obtaining of the Bill; it would give to the whole community, up to the year 1866, the right of calling themselves veterinary surgeons, and of practising under that title ?—If all those persons who have not been educated at the colleges were to cease to practise at once we should have very few veterinary surgeons left in the country.

4822. Do you not take a misconception of the views of the veterinary profession upon that point ? The veterinary profession by their bill do not seek to prevent the practice of those men; all they seek is to prevent their practising under the title of " veterinary surgeon "?—That is the meaning of my Bill, particularly of that clause which I read; it relates to the practising under the name of veterinary surgeon.

4823. But it is not consistent with your replies to the noble chairman, as I understood them. I gathered from your answers that the object of the Bill is to prevent such parties from practising ?—From practising under the name of " veterinary surgeon." The clause that I read just now was directed to that object.

4824. Do you not think that it would be better to apply to Parliament for the prevention of parties using that title who have assumed it since the obtaining of the charter ?—There can be no objection to that. It is, however, a long time since the charter was obtained. The date of the charter was 1844.

4825. Do you think that in such a case the Bill would be considered retrospective in its action, inasmuch as the charter, although it does not impose a penalty, says that the Queen grants a certain privilege; that is, that certain persons who have undergone such and such an education shall, exclusively of all others, be entitled to call themselves " veterinary surgeons ?—It might. I can hardly say.

4826. (*Viscount Cranborne.*) To avoid any misunderstanding, let me ask you what the meaning of that part of the Bill is which inflicts a penalty for doing anything whereby the public may be led to believe that a person belongs to a veterinary college. Do you mean thereby to prevent the assumption of such a title as " cattle doctor " ?—No, not at all. A " Member of " the Royal College of Veterinary Surgeons," I think, is the title.

4827. What could a man do to induce the public to believe that he was a member of the Royal College of Veterinary Surgeons, unless he brought himself within the mischief of the other part of the Bill which forbids his calling himself by that name ?—He gets employment by the public under the impression that he is a professionally educated man.

4828. What is the precise act against which that clause of the Bill is levelled ? What is it precisely which you wish to prevent when you forbid a man to do anything whereby he may be thought to be a veterinary surgeon ?—I only want him to have had an education, and to have given a proof of it by obtaining a diploma. At present, a very ignorant man passes as a member of the Royal College of Veterinary Surgeons without having received any of the education at all, and he comes and doctors our animals.

4829. Do you wish to prevent that ?—Certainly; I wish to prevent that.

4830. Do you really adhere to that answer, that you wish to prevent an ignorant man doctoring my animals if I wish to have an ignorant man to doctor them ?—It is a very great pity if he does doctor them.

4831. I think you must have misapprehended my point. Do you really mean to say that the object of your Bill and the object of the veterinary profession is to prevent ignorant men from acting as doctors of cattle, if people choose to employ them, knowing them to be such ?—That is not the object of the Bill. The object of the Bill is to raise the professional status of the veterinary surgeons.

4832. (*Professor Spooner.*) Would not your answer to the question of the noble Viscount, as to the Act rendering a person liable to a penalty, rather be, that all persons would render themselves liable to the penalty who practise upon animals, calling themselves "Veterinary Surgeons," or placing over their doors the title of " Veterinary Surgeon "?—Yes.

4833. Thereby leading the public to suppose that they are veterinary surgeons, when in reality they are not; that would be your answer, would it not ?—Yes; that would do as well as what I have already given as the answer.

4834. (*Chairman.*) You considered the Act for the prevention of infectious diseases which was brought in in 1864, did you not ?—Yes; the one that was brought in by Government.

4835. Did you bring in a Bill in 1864 yourself ?—I brought in a Bill in 1863.

4836. And in that year you withdrew your Bill ?—Yes.

4837. But in 1864 there was a Bill proposed and brought in by Government ?—There was a Bill brought in by the Government, but they subsequently withdrew that Bill.

4838. What were the particular alterations which they wished to introduce by that Bill into the present system ?—The Bill was divided into three parts; the first part related to the general law as to diseased cattle, namely, with regard to the public exposure of diseased cattle and the sale of diseased cattle; the

second part contained special provisions against epidemics in cattle, and provided, first, that special regulations should be made by Order in Council as to cattle; it provided for the application of the Order, and the penalty for disobedience; then for the Orders in Council to be published in the Gazette and county newspapers, and for the Orders in Council to be laid before Parliament, and with regard to obstructing persons carrying into effect the Orders in Council; the third part had reference to the carriage of cattle by railway and otherwise. The first clause in it related to the cleansing of the trucks, and the next to the watering of the cattle on long journeys; and the next clause gives permission to the carriers to refuse to carry diseased cattle.

4839. With regard to the first part of the Bill, do you think that the present regulations with respect to the exposure of animals in the markets, and so forth, are satisfactory?—I think that if this Bill had passed it would have improved the state of things upon each of those points very much.

4840. It would have increased the permanent powers of the inspectors of markets, would it not?—Yes; very much.

4841. Do you consider it practicable to have an inspection of all these markets permanently?—I think it might eventually be permanent. I do not suppose that the inspectors whom we have introduced at this time during the prevalence of the Cattle Plague will be altogether dropped.

4842. You think that it would be desirable in ordinary times, when there is no special disease calling for particular measures in the country, to carry on the inspection as a permanent thing?—That is my impression.

4843. Would it be practicable to inspect a market like the Falkirk Tryst?—It would be very difficult to do it. We were told in committee that it would be impossible to do it; we had evidence to that effect.

4844. You would not be in favour of introducing in a new measure an inspection such as that?—Whatever new measure is brought in must be brought in by Government.

4845. Would your own opinion now be opposed to the inspection of markets of that sort?—It would be impracticable, I am afraid, at Falkirk.

4846. Then if we pass over the special powers in cases of epidemics breaking out, and come to the third part of the Bill, which refers to the conveying of stock by railway, steamboat, or otherwise, do you consider that the present state of things is very unsatisfactory?—Yes; I think it might be amended.

4847. Will you state how you think it is unsatisfactory?—I think the proposal in this Bill was a very satisfactory one.

4848. Do you consider that the conveyance of stock by railway is very badly managed at the present time?—Yes, certainly.

4849. Would you state in what way you consider it unsatisfactory?—From the long time that the cattle are kept without water when they come up from Scotland, for instance, to London; and then again it is unsatisfactory from the way in which they are shunted and injured by pressure against one another, or by being thrown down in the truck and trodden upon.

4850. What is your opinion with regard to the state of the steamboat carriage?—It is pretty much the same. But I may state that the steamboat carriage is very much improved of late.

4851. Will you state generally, without reading particularly the clause, how you would like to regulate the railroad traffic?—I should regulate it in the way in which it is arranged in this Bill of last year.

4852. That is by clause 12, is it not?—Yes; that section refers to the cleaning of trucks; that is done almost all over the country, I believe, at this moment.

4853. But in ordinary times do you consider that the trucks are in a very filthy state?—I know more of the conveyance by the Midland than on any other line, and certainly their trucks are being attended to now. I believe they have actual inspectors of their own to travel up and down the line, to see that the trucks are prepared after each journey for fresh cattle.

4854. You are speaking now of the present time?—Yes; that is what they are doing at this moment. They have commenced that system; but I do not believe that they will ever leave it off again. That is one of the best arranged lines, I think.

4855. Do you consider that the steamboats are very much crowded?—They have very much improved also.

4856. You would wish that regulations for all those matters should be framed by an Act of Parliament?—Yes, certainly.

4857. And you would have them in constant operation?—Yes; they should be in constant operation. The watering of the cattle is of great importance. I may state that there are two or three inventions for effecting the object; I think there is a patent taken out for one of them. The trough is to be placed alongside the truck without taking the cattle out of the truck; the truck being so formed that the cattle can reach the trough, and drink without being unloaded.

4858. (*Mr. Read.*) Who opposed the Bill when it was before Parliament?—The graziers and the butchers and the salesmen; all Ireland and almost all Scotland. All those influences were brought to bear.

4859. Were there not some very stringent clauses in it with regard to the foot-and-mouth disease?—Yes.

4860. And those clauses excited considerable opposition, did they not?—Very great.

4861. They were struck out before the Bill was abandoned?—Yes; there were a great many alterations made in the Bill during its progress.

4862. With regard to the importation of cattle, would you have inspectors appointed at the ports of embarkation?—Most decidedly; but even then it would be a very difficult thing to prevent cattle from coming into the country after having been in contact with cattle which had been thrown overboard, because they had fallen victims to disease. I heard yesterday a remarkable fact with reference to the conveyance by steamboat from Hamburg. A gentleman from Northumberland told us that it was not one occurrence only, but the practice, that if any cattle are taken ill on the passage on board a vessel coming from Hamburg they are thrown overboard; so that when the vessel arrives at the port of discharge to which she is destined that part of the cargo which is left is inspected, and found to be in a healthy state; but it is not mentioned then that there were other cattle on board with whom those apparently healthy cattle had been in contact during the voyage.

4863. Do you not think that it would be advisable to have a sort of bill of lading of the number of cattle that are embarked, and to require an account to be given of those that are missing?—Certainly; that might do something. I may say that I have just come from Lord Granville. I accompanied a deputation of the Royal Agricultural Society's Council. We met to the number of about 40 in Council yesterday, and we were unanimous with regard to certain resolutions which we adopted, and which are very stringent. We have placed them before Lord Granville to-day. One of them relates to the importation of cattle. Those 40 gentlemen might be said to represent a large proportion of the agriculturists of England, for they come from different parts of the country. "It is submitted that all foreign cattle, sheep, and "pigs should be slaughtered at the port of disem- "barkation, and their skins disinfected forthwith. "But in case this should be considered too strin- "gent a proceeding, then the owner or consignee of "any imported cattle, sheep, or pigs, or his agent, "shall be obliged to state on their arrival in port to "what town or place he intends to forward them. "After being duly inspected, and certified to be free "from disease, they shall be marked with a special "brand, and be allowed to proceed, and shall be

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"slaughtered at such town or place," and not be permitted to leave it again.

4864. Would it be advisable in your opinion that certain restrictions should be placed upon the number of cattle that are conveyed in trucks? Are not the cattle in the trucks very often overcrowded on the railways?—Very often indeed.

4865. Until lately that was a very common occurrence, I believe, in ships?—Yes; the more they could get in the less they had to pay.

4866. The chief opposition to the Bills before Parliament was directed, was it not, to that part which related to diseases rather than to that which related to importation of cattle?—No; it was against the inspection.

4867. The inspection where?—In the country. The opponents of the Bill did not like the idea of an organized inspection.

4868. What I meant to ask was this: the opposition was directed chiefly against the Cattle Diseases Bill rather than against the Cattle Importation Bill; was not that so, according to your recollection?—Yes, it was.

4869. (*Professor Spooner.*) No doubt you have given your attention to the construction of trucks for the conveyance of cattle on railways?—Yes.

4870. Is it your opinion that any decided improvement might be made in them?—An improvement might be made in the buffers, certainly. On many of the railways they are now improving them, because the loss is so great; when the animals arrive at their destination they are obliged to be killed immediately, they are so bruised. But if the buffers had a better kind of spring attached to them it would make a very great difference to the cattle.

4871. As regards the body of the vehicle, do you not think that it might be so constructed as that the animals might stand side by side with their heads projecting outwards, instead of being all turned into a common open body of a truck?—That was part of the arrangement when it was contemplated to supply them with water. I think it was intended that they should be so placed that each animal should have its head in such a position as to get at the water trough.

4872. That could only be effected by a partition in the trucks which does not now exist?—It would require a peculiar arrangement of the animals in the truck. At present they are not arranged at all.

4873. Am I to understand that it is your opinion that it is advisable that that should be done?—Most decidedly.

4874. (*Chairman.*) Is there anything else which you would wish to bring before the Commission?—I am not aware of anything.

The witness withdrew.

EDWARD BALLARD, Esq., M.D., and Mr. ROBERT MURRAY, examined.

E. Ballard, Esq., M.D., and Mr. R. Murray.

4875. (*Chairman.*) (*To Dr. Ballard.*) I believe you are medical officer of health for the parish of St Mary's, Islington?—Yes.

4876 (*To Mr. Murray.*) Will you state whether you hold any position which has brought you into contact with cows suffering from the cattle disease?—I am the inspector for Islington.

4877. Are you a veterinary surgeon?—I am.

4878. (*To Dr. Ballard.*) The disease broke out very early in your district, did it not?—It did.

4879. Can you give us any views with regard to the origin of the disease in your district?—I can tell you all that I know of it. I made some memoranda about it. The first cases of the disease were at the shed of Mrs. Nicholls in the Liverpool Road. She purchased six new cows, according to the information I received some time after the outbreak. The first case occurred about the 27th of June, but the first that I heard of it was on the 27th or 28th of July.

4880. You are not aware of any earlier case than that of Mrs. Nicholls?—No; that was the first case.

4881. Has the disease extended very largely in your district?—It has. Up to the present time the total number of cases which have come to my knowledge are 694, or thereabouts. Of course one cannot tell precisely. That list goes up to the end of November. I have kept a record month by month, or nearly so.

4882. What does that number 694 represent?—There have been 694 cases of animals suffering from the disease. The number of deaths has been 611. When I say deaths, I ought to add, that it is difficult to distinguish between those that died and those that were slaughtered on account of the disease; but taking the two together 611 is the number which I have.

4883. Have you formed any opinion as to the origin of the disease?—I have, as regards Mrs. Nicholls's shed. What I heard from Mrs. Nicholls was that six cows were brought into the shed, or rather into a quarantine shed about a week before the outbreak, from the Cattle Market; that those cows, six in number, were attacked on the 27th of June, and that they all died.

4884. (*Professor Spooner.*) Were they English or foreign cows?—I cannot tell you. They were taken into the quarantine shed, and died; and then the disease crossed a yard about 50 or 60 feet wide into the principal shed where about 80 cows were kept. The yard between the two sheds is one in which the dung is stored from both sheds, and the same person, I was informed, attended to the quarantine shed as to the principal shed.

4885. (*Chairman.*) Then, without going particularly into that case, which we have had rather in detail before, will you state whether you believe the cause of the disease in that shed to have been the state of the shed, or do you believe it to have been introduced?—It was certainly not the state of the shed. It is one of the best sheds in my parish for cleanliness and arrangement.

4886. You believe then that it was introduced by those animals which were bought in the public market?—I do.

4887. Will the same cause account for the breaking out of the disease in many other sheds in your district?—Yes; it can be accounted for by the introduction of cows. I have some account of the origin of the disease in some of the earliest sheds that were attacked. The second shed that was attacked in my parish was Mr. Dennison's, which is the nearest shed to Mrs. Nicholls's. It also is a very excellent shed; it is a new shed, and well arranged, and kept very clean. Mr. Dennison's shed was attacked about the beginning of July, that is to say, he lost four cows on the 10th of July. Those were the first animals that he lost. The third shed or thereabouts that was attacked belonged to a person of the name of Liddiard in Hale Street; it was not actually the third shed that was attacked, however. I think Wingrove's in Queen Street was the third. In Liddiard's case it appears that he had received some three cows, towards the end of July, from a shed that was infected belonging to a man of the name of Wingrove.

4888. (*Dr. Parkes.*) Then his case comes from Wingrove's?—Yes. Mr. Liddiard's shed was affected, and he lost 13 cows between the 27th of July and the 1st of August. That was the beginning of it, as I have been informed, in Mr. Liddiard's case. Then the next was Thurtle and Harvey's, which is the largest shed in my district; I believe it is Harvey's now. That firm used to have on the average 400 cows, and they had been in the habit of continually purchasing from the market. I believe the first cases at Harvey's took place on the 5th of August, when two cows were taken ill in a new shed. Harvey has two sets of sheds; one, a very fine, new, well-ventilated large shed, and the other a very old set of sheds, and not particularly well kept; but the disease broke out in his new shed, not in his old ones. He is continually buying fresh stock.

4889. (*Chairman.*) What loss had he?—It is difficult to tell the precise numbers. Mr. Harvey is

stated to have had about 200 cases of disease, and he is said to have lost 168 animals; but then he sent a great many to market. I know a great many that went to Atcheler's for slaughter.

4890. Have you remarked whether amongst those that remain in the shed there is a great proportion of Dutch cows?—A good many that I have seen are Dutch. I think the Dutch form the majority in our sheds; but Mr. Murray will be able to say that better than I can.

Mr. Murray.—The Dutch cows were those that were left.

4891. (*To Dr. Ballard.*) The Dutch cows seem to recover more from the disease than the English cows?—I have not observed that.

4892. (*To Mr. Murray.*) Do you not think that that is the case?—I imagine that the majority of Mr. Harvey's cows were Dutch, so that I can draw no conclusion from Mr. Harvey's case.

4893. (*To Dr. Ballard.*) What was the next case in your district?—It was in Wingrove's shed, in Elmore Street. On the 20th of July he found two cows which he had bought the week before, poorly, and therefore he sent them to the market. That is the account we have of it. On the 27th he bought five new cows, and the disease appeared on the 7th or 8th of August. This outbreak seems to be connected with the introduction of the new cows into the sheds. Those were all the early cases. Of course one can only trace the origin of the disease in the early cases; in the later ones it is difficult to trace it. As regards sheds situated in the same yard, there are two persons called Huckett and Grant, who occupy sheds in the same yard at Ball's Pond; they use the same cistern and dung pit. Mr. Huckett brought a fresh cow into his shed, which was poorly when it came in, and shortly afterwards the disease broke out in that shed. A person called Rance has two sheds at a distance of about a quarter of a mile apart; he is the owner of both of them. The disease broke out in his two sheds about the same time, or within a short period of one another. Two other persons have their sheds in one and the same yard; one of the name of Pym; the other the firm of Pecket and Lowther. In that case the disease broke out about the same time in the two sheds in the same yard. They use the same water supply, and have the same dung pit. A person called Vicary has recently been attacked; he had five or six new cows in just before the outbreak in his shed. Most of those were early cases; but Vicary's is a late case. I may state that full inquiries have been made into all of these cases. My impression is, from negative facts as well as from these positive ones, that the disease was connected with the introduction of the new cows into sheds in each of the instances when this is stated to have happened.

4894. You have stated a good many cases where the disease has been introduced by the purchase of new stock; do you know many cases where there has been an exemption from disease?—I can tell you which sheds have been exempt in my parish.

4895. Are there a great number that have been exempted?—No; the majority have been attacked.

4896. (*Mr. Read.*) The great majority?—The great majority have been attacked. I can tell you the number.

4897. (*Chairman.*) Without specifying them, perhaps you can give us the numbers of those that have been attacked and those that have escaped?—Up to the present time there are 21 sheds in my parish which have not been attacked; 47 have been attacked up to the present time, or, rather, up to the 30th of November.

4898. Has there been any different system pursued by the owners of those 21 sheds which escaped from that pursued by the owners of the 47 sheds that were attacked?—If you mean by way of prevention, there was none.

4899. Have they purchased in the market?—I cannot answer that question. I do not know.

4900. You do not know two cases within a short distance of Thurtle and Harvey's place, one called the Richmond Dairy, and the other on Haverstock Hill?—I do not know them by the names of the places. I have the names of the owners only.

4901. Do you know the case of Mr. King, in Hemingford Road?—No; but Mr. Murray will very likely be able to give information about that.

4902. (*To Mr. Murray.*) Do you know that case?—I am not aware that Mr. King has had any disease.

4903. Do you know what precautions he has taken?—He has been very attentive, generally, to his cows, and uses disinfectants a good deal.

4904. And he has not purchased in the market, has he?—He purchased one cow lately, but not in the market; at least that is his own statement.

4905. Have you been into his shed?—I have.

4906. (*To Dr. Ballard.*) Do you consider that the state of the dairies has improved of late years?—Undoubtedly it has in my parish.

4907. What has caused that improvement?—I think the legislation on the subject of the licensing of the sheds.

4908. Do you think, therefore, that it is less likely that a disease should have been generated in those cowsheds in their improved state than before this Act was passed?—I cannot say anything about that, because I am not satisfied that the cleanliness of the shed has very much, if anything, to do with the outbreak of the disease.

4909. The sheds are, however, in a cleaner state?—They are in a cleaner state, certainly. I may state that some of the sheds where the disease first broke out were some of the cleanest in my parish. Mrs. Nicholls's is one instance, Dennison's is another. Wingrove's, Huckett's, Grant's, Rance's, and Harvey's new shed, are all some of the best sheds in my parish, and yet they are sheds where the disease earliest broke out; whereas some of the worst sheds, I may mention especially those of Webb and Humphreys and Cook, are amongst those that have been attacked quite lately.

4910. Do you believe that the disease could have existed in any sheds long before it came to your knowledge?—Not lately. I am certain that it has not done so lately, because Mr. Murray and another inspector whom we have had visiting the sheds must have known of any case.

4911. Do you think that it could have been so at the commencement of the outbreak?—From the middle of August, when Mr. Murray was appointed, we must have known of every outbreak directly it occurred.

4912. My question rather refers to what took place before that time?—Then I should not have known of it, certainly; in fact the cowkeepers kept it secret as long as they could.

4913. Have you anything to state with reference to the disposal of the carcases?—Yes; I can tell you what carcases were disposed of at Belle Isle. I can only give an account of those, because Belle Isle alone is in my parish.

4914. What is Belle Isle?—Belle Isle is a district in my parish where the cows are destroyed. The total number received at Belle Isle altogether was 626 dead cows and 37 alive; but from my parish the number received was nothing like that; it was only 77.

4915. Is Belle Isle a place appointed by the Government inspector for the reception of carcases?—I do not know whether it is appointed by the Government inspector; I think not. We protested against its being appointed in that manner, on account of the nuisance.

4916. What became of the carcases of the animals that had died of the disease in your parish?—I cannot tell you; a good many of them, I am afraid, went for food. I include here those slaughtered on account of disease.

4917. Where would they be sent to in order to be disposed of?—If you mean for destruction, naturally to Belle Isle.

4918. When they were not sent there, where would they be sent to?—I cannot tell; perhaps to some of the other boilers in other parts of London; but Belle Isle is the most convenient place of all for my parish,

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because Belle Isle itself is in my parish; it is on the outskirts of it, and out of 611 cows that died or were slaughtered in the parish only 77 went to Belle Isle. What became of the others I cannot tell; certainly some that were diseased were slaughtered for food in the earlier part of the outbreak; it was admitted that they were.

4919. There are a great many private slaughter-houses in your district, are there not?—Yes, a good many; I cannot recollect the precise number.*

4920. (*To Mr. Murray.*) Can you tell us what the number is?—There are very nearly a hundred altogether in the parish.

4921. (*To Dr. Ballard.*) Do they facilitate the making away with the sick animals?—I do not think they do; I think there is too sharp an eye kept upon them; they have been visited since the middle of August as regularly as the cowsheds, and I am satisfied that none of the sick cows have got into the private slaughter-houses since then. What might have been done previously I cannot tell; but some of the cow-keepers in the early part of the attack stated that they sent them to the slaughter-houses at the Metropolitan Cattle Market.

4922. And yet the disease was not discovered when they were sent there?—The disease was not discovered; at least the first I heard of it was at the end of July.

4923. Is not there a system of inspection at the slaughter-houses in connexion with the Metropolitan Market?—Yes, I believe there is. There is an inspector appointed by the City authorities at the Metropolitan Cattle Market.

4924. Ought not those inspectors to be able to discover any animals that come in a diseased state to those slaughter-houses?—They ought.

4925. Do you consider the arrangements at the Metropolitan Cattle Market generally good?—I can scarcely give an opinion upon that point; all I can say is this, that there is some reason to believe, I think good reason to believe, that in some cases diseased beasts have been received there, into the regular slaughter-houses, where the beasts are slaughtered for human food. There is one slaughter-house there for diseased animals alone, and in two instances at least we have knowledge (I think I may say positive knowledge) that beasts have gone from there for human consumption.

4926. Though they have been slaughtered in the slaughter-house set apart for the purpose of killing diseased animals?—Precisely. Mr. Murray can give you more information about that, because he is more engaged in the slaughter-houses than I am; he can give you the cases.

4927. (*To Mr. Murray.*) Do you consider that many animals in your district have been sent to private slaughter-houses when they first showed symptoms of the disease?—I think that, in cases where the proprietors have made away with a few of their cows at the very beginning, and said they were healthy, before I had an opportunity of seeing their stock, it is very probable that those animals had the first symptoms of the disease, and they did go to private slaughter-houses.

4928. Are the inspectors appointed merely for the purpose of avoiding nuisance to public health, or is it their duty to inspect with regard to the cattle diseases?—With regard to the Cattle Plague; at least that is my duty.

Dr. Ballard.—Mr. Murray's duty was in great part to prevent, if he could, the introduction of diseased meat into human consumption.

4929. (*To Mr. Murray.*) Are you aware of those cases which Dr. Ballard has quoted of diseased animals having been killed at the Metropolitan Market, and their carcases then having been sold for human food?—Yes; I know of two instances.

4930. Would you state what those instances are?—One was the case of an animal belonging to a cow-keeper in the Liverpool Road. It had the disease for I think about three days, and was then sent to what is called the corporation slaughter-house as a diseased animal, with a view of seeing whether the meat was fit for food or not. It was there passed for human food; when I say "passed," all I know is that the proprietor of the cow stated to me that he got 5*l.* for the carcase for the market. In the second case, the owner, a cowkeeper in Barnsbury Grove, got 6*l.* 10*s.*

4931. Was it passed by Mr. Tegg, the inspector of the Metropolitan Market?—I do not think Mr. Tegg saw the first carcase. I afterwards saw Mr. Tegg on the subject, and he gave me to understand that he had not seen the carcase; but he has assistants there, and I presume it was one of the assistants who passed it.

4932. (*To Dr. Ballard.*) Have you anything to state as to the regulations in force for licensing the sheds?—I have a copy of the regulations which are in force in my parish which I can leave with the Commission, if you think fit, or I can read them now.

4933. Those regulations are drawn up, I presume, by the vestry?—They are drawn up by myself, and acted upon by the vestry.

4934. The vestry have had them drawn up as rules to guide them as to whether they are to prosecute or not in each case?—Yes; they form the basis of my recommendations to the vestry as to opposing any licence.

4935. The vestry have not the power of giving a licence?—No; they have the power of opposition, and they exercise it.

4936. Are those regulations drawn up with regard to the health of the animals, or only with regard to the sanitary condition of the houses round the sheds?—With regard to the health of the animals, and also with regard to the sanitary condition of the neighbourhood.

4937. In certain cases where the strictest regulations are carried out with regard to the health of the animals, I suppose a shed might not be licensed at all?—A new shed would not be licensed if it were too close to human dwellings, or if it were in a very poor and crowded neighbourhood.

4938. Will you put in the regulations?—I will.*

4939. Do you consider that the system of licensing works well at the present moment?—I do.

4940. Has it improved the condition of the cow-sheds?—Most undoubtedly.

4941. Have the vestry of Islington taken any proceedings with regard to the Cattle Plague?—They have. When I first brought it to their knowledge they appointed two inspectors to visit the cowsheds and slaughter-houses regularly, and to advise the cowkeepers upon sanitary matters; afterwards, on the issuing of the Order of the Privy Council for appointing inspectors, those two inspectors of our own were appointed again by the magistrates, under the Order of the Privy Council, and had additional powers given to them, so that they might be free to act in any emergency, and they have acted under those powers; but for the most part they have informed Mr. Priestman, the Government inspector, of any outbreak that has taken place in the sheds. Had it not been for that Mr. Priestman would not have known of a good many instances in which an outbreak occurred. Mr. Priestman only visited when he was sent for, and the cowkeepers were disposed to keep the thing quiet. The vestry have also appointed a special inspector at Belle Isle, to look after the animals brought in there for destruction, and to see that they are destroyed, and that the hides are properly disinfected, and the manure also disinfected. Prior to the appointment of that inspector the hides used to go away with other hides without any further trouble being taken about them, and the same was the case with the manure; it used to be removed by a contractor without disinfection; but I served a notice upon all the boilers and knackers at Belle Isle, requiring them to disinfect their hides and manure before they allowed them to

* The witness subsequently stated that "the precise number of licensed slaughter-houses is 100."

* See Appendix E.

leave their premises, and this inspector sees that it is done. We have also made several seizures of beef which was condemned by the magistrates on the premises of salesmen at Belle Isle. That occurred in August. At the Michaelmas licensing certain sheds which had become infected and were empty, and required disinfection before they could be used again, were opposed by the vestry, and their licences were refused. The vestry altogether has taken a great deal of interest in the matter.

4942. (*Dr. Parkes.*) With respect to this licensing system which you have said works sufficiently well in ordinary times, would you suggest any change in it, or in the inspection of the cowsheds ?—Yes. As regards the licensing I think that the number of cows to be permitted in a shed should be named in the licence. As it is, if a cowkeeper gets a licence for keeping cows he may keep as many as he can cram into his shed.

4943. How would you regulate that number in the shed; by the cubic space ?—Partly by the cubic space; of course I should regulate it by cubic space, mainly.

4944. What amount of cubic space would you give to an animal ?—Not less than 1,000 feet. I think I can show that the cubic space has something to do with the spread of the disease; that in the more crowded sheds it has spread more. The same relation was observed in the case of the lung disease in 1857.

4945. Would you regulate the number of cows in a shed by anything else than cubic space ?—I should regulate it mainly by cubic space; but if I found more than usually good ventilation I might perhaps be disposed now and then to reduce the cubic space that was required.

4946. Would you require any evidence as to the ventilation of the shed, and as to a sufficient water supply ?—All those matters we see to now; they are amongst our requirements which have to be complied with before a licence is granted.

4947. You get them complied with by threatening to oppose the licence, I suppose ?—Yes.

4948. Would it not be more easily done by making it an understood thing that the licence should not be granted until those requirements were complied with ?—Yes.

4949. With regard to the general cleanliness of the cowsheds in the parish, are they generally kept pretty well, or do they require constant superintendence and inspection ?—They are always kept closely looked after; but some of them are even now in a bad condition; most of them are kept very clean. I speak now of course of the time since the licensing. Before that they were in a very dirty state, but most of them are now kept very clean. There are very few sheds which are habitually kept dirty and slovenly now.

4950. Do you think that if kept in a proper way these cowsheds do any harm or are any nuisance at all in the parish ? Would you allow them to remain there, or would you insist upon cowsheds being entirely suburban ?—I think it would be as well that they should be suburban, that is to say, that they should be removed from the metropolis; that is the opinion of the sanitary committee of our vestry, who passed a resolution to that effect. I may state, however, that I cannot trace any actual mischief from their presence in any instance.

4951. I understood you to say that you thought you had observed that the Cattle Plague had spread more in the crowded sheds than in the less crowded ones ?—It has. I may just give you the general result. Taking 53 sheds where the disease broke out, I find that the cubic capacity of those 53 sheds taken altogether was 606 feet per cow. On the other hand, in 20 non-infected sheds, where the disease did not break out, the cubical capacity was 803 cubic feet per cow, showing a distinct difference of about 200 cubic feet. You will observe that I speak of sheds, not of establishments. I think those figures prove that the disease has certainly shown a preference for the more crowded sheds.

4952. Do you think that the facilities for the introduction of disease into the sheds were equal, or did the owners of the one class of sheds buy fresh stock, and the others not ?—I cannot trace that at all.

4953. You think that it is just as likely that new animals had been introduced into the one as into the other ?—Quite as likely, I think.

4954. Have you made any special inquiry upon that point, to see whether it is really the greater cubic space allowed to each cow which has lessened the chances of the introduction of the disease ?—I have made a table showing the space allotted to each cow in the two sets of sheds; for instance, there was only one shed allowing 2,000 feet and upwards to a cow, and that was not attacked at all. There were two sheds with 1,500 cubic feet per cow, and those two sheds were both attacked. There were six sheds where there were between 1,000 and 1,500 cubic feet per cow, and of those two were attacked and four were not. There were seven sheds in which there were from 800 to 1,000 cubic feet; of those, five sheds were attacked and two were not. There were 13 sheds where there were 600 cubic feet and under 800; of those, nine were attacked, and four were not. Then coming to sheds with smaller cubical space per cow, there were 27 with from 400 to 600 cubic feet; of those, 22 were attacked and five were not. Of the sheds having from 200 to 400 cubic feet there were 11, and out of those nine were attacked and two were not. So that when you come to put those rows of figures together and contrast them you will see that there is some relation borne by the attacks of disease to the cubical capacity.

4955. Do you think that the chances of the introduction of the disease by buying were equal in the two classes of sheds ?—I think so. I do not know anything to the contrary; but I shall be able to tell you more about buying presently. I have a memorandum especially about buying. The result of those figures is not to show a distinct rule; but it does show a difference, and the difference is in favour, so far as the propagation of the disease is concerned, of the more crowded sheds, and the last numbers I have given with the small cubical capacity seem to show it more clearly than anything.

4956. Could you put in a return stating these facts, giving the number of cows in the different sheds, and per-centage of attack and escape according to the cubical capacity ?—I have a table here with the space in each shed. This table also relates to several other matters, such as the water supply and so forth; but it shows the number of cows usually kept, the cubical capacity of the shed, the cubic space per cow, the water supply, the position of the dung-pit, whether in the shed or out of the shed, the cases of the Cattle Plague, the numbers that died or were slaughtered on account of the Cattle Plague, and the number of the cows in the shed on the 30th of November, and out of those the number that were ill of the Cattle Plague. Then it shows the number brought into the shed since the infection; and lastly the number of cases among the cows newly brought into the infected sheds.

4957. Will you hand it in ?—I will.*

4958. But the impression upon your mind is decidedly so far that the cubic space allotted to a cow has an influence upon the propagation and development of the disease ?—The impression upon my mind certainly is that it has something to do with it. I do not say that it has to do with the development of it; but the cows in the crowded sheds seem to me to be more liable to attack than the others.

4959. You do not believe that in those cases the disease in any instance originated spontaneously ?—I do not; quite the contrary.

4960. You believe merely that having been introduced it spread more in the crowded sheds than in the less crowded ones ?—Not only that it spread more, but that the animals there were more likely to suffer from the poison when introduced in any way.

4961. You did not inquire particularly into the

* See Appendix E.

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number of beasts purchased in these different classes of sheds?—No.

4962. In order to see whether the immunity of some of the sheds with large cubical space was not owing rather to the disease never having been introduced than to the disease having been introduced and not spreading?—I cannot tell how the fact may be with regard to that.

4963. Have you any case of disease occurring in a large shed where one beast was attacked which had been lately bought, and then no other case occurred?—No; but Mr. Murray may know of such a case.

4964. Have you any reason to think that the disease in any case has been propagated by means of the drinking water of the cows?—I have.

4965. Will you state the particulars?—Most of the sheds in my parish are supplied by New River water; but 10 sheds are supplied by water from superficial wells. Of those 10 sheds, nine have suffered from the disease; one only has escaped at present.

4966. (*Viscount Cranborne.*) What is the proportion on the other side?—It is very much larger on the other side. I could have taken it out; it is not stated in the paper I have handed in.

4967. (*Chairman.*) What is the other water which is put down in this table besides the New River water?—It is the water supplied from wells in the yards or sheds. This, I think, is an important fact. The very first shed attacked was Mrs. Nicholls's, and through Mrs. Nicholls's the disease spread rapidly. Now that shed is supplied with water from a well actually in the shed.

4968. (*Dr. Parkes.*) And that well is a superficial well, is it not?—Yes; that well is a superficial well.

4969. And has a chance of being contaminated with the sewage from the animals?—Yes; it has a chance of being so contaminated, because the drainage may be leaky.

4970. (*Viscount Cranborne.*) Have you analyzed the water of any of these wells?—I have not; but there stands the fact as to the attacks.

4971. (*Dr. Parkes.*) In that case is the well in such a position as to be likely to be contaminated by the sewage?—I think it is; it is in the shed, and it cannot be many feet from the main drain of the shed; it is in the middle of the shed, and the drain runs down the shed; and although the shed is paved with brick, and well paved too, we know that liquid matters will ooze through between the bricks, and will soak into the soil under the best of circumstances, unless the paving is laid properly upon concrete.

4972. (*Viscount Cranborne.*) Is it too late to have the water of those wells analyzed?—I do not suppose it is too late.

4973. No alteration has been made in them?—No alteration has been made that I am aware of. The drainage has been relaid in Mrs. Nicholls's shed I believe to some extent; some alteration has been made in Mrs. Nicholls's shed.

Mr. Murray.—There are new drains there.

Dr. Ballard.—Liddiard's shed is another in which the well is in the shed itself.

4974. (*Dr. Parkes.*) Have you at all taken out the per-centage of the attacks in those sheds that are supplied with New River water and those that are supplied from superficial wells?—No; but I could easily get it out. I have all the materials here.

4975. (*Viscount Cranborne.*) Will you also give us in the other table the per-centage of the cubical space of the sheds?—I will add that to the table.

4976. (*Dr. Parkes.*) What is the ordinary depth of those superficial wells?—I do not know. I have never seen them opened.

4977. In all cases they are merely sunk in the earth, I suppose; in the clay or whatever it may be?—Exactly, until they get water.

4978. They may be perhaps 20 or 30 feet deep?—Something thereabouts. They are of no very great depth; when they get water they stop.

4979. (*Viscount Cranborne.*) What is the soil in that neighbourhood?—In my parish it varies. Round Mrs. Nicholls's it is gravel, and at Mr. Liddiard's, where the well is in the shed, it is a sort of gravel or brick earth; in other parts it is clay.

4980. (*Dr. Parkes.*) Then the impression upon your mind is very much in favour of the idea that the water may possibly have been the means of communicating the disease in these cases?—My opinion is that it is in some way connected with the outbreak, but whether it was the means of the communication of the disease I cannot tell.

4981. With regard to the first cases in Islington, those in Mrs. Nicholls's shed, have you in your inquiries been able to learn whether there were any cases prior to those in Islington or in any other parts of the metropolis?—I cannot speak of anything relating to the rest of the metropolis, but in Islington I am certain that they were the first cases. I say that after inquiry.

4982. I think you say that six cows were attacked on the 27th of June?—Yes, I think there were six.

4983. Were there six attacked, or was it only one or two?—Six; so I am told. My informant is Mr. John Nicholls.

4984. All those six cows were bought at the Metropolitan Market?—Yes; so he told me, to the best of my recollection.

4985. And all about the same time?—Yes; that was what he informed me.

4986. Those six cows were in a sort of quarantine shed, were they not?—Yes; and there were about three old cows along with them at the time. I was told that those three old cows were not attacked until after the attack in the principal shed.

4987. Is that shed near the lairs where animals are kept between the markets?—It is close by the lairs.

4988. Was it supposed at all that the disease was communicated from those lairs to those cattle?—I never heard that stated.

4989. With regard to disinfectants, will you tell us what disinfectants are used?—Chloride of lime mostly. Some few have used Condy's Fluid, and one, I believe, has used Stockholm tar and Condy's Fluid as well, but the principal disinfectant used is chloride of lime.

4990. Have you any opinion yourself as to the best disinfectants?—I have not. The chloride of lime, I may state so far as we have gone, has answered uncommonly well. I will tell you the result of its application. I have a memorandum here of the fresh outbreaks in previously infected sheds among cows newly brought in. In some of those cases disinfectants were freely used; I think I may say in almost all; and I can give you the result of the attacks in the cases of newly brought-in cows in those instances.

4991. They having been put in infected sheds?—Yes; in infected sheds. I find that there are 18 cowkeepers who bought cattle, and put them into the infected sheds, during the period of the prevalence of the disease. In only five of those instances have the newly brought-in cows been attacked; that is to say, five out of the 18; 13 have had no fresh attacks amongst them. Of those five in which the cows were newly attacked, one belonged to Mr. Harvey. Mr. Harvey has never had his shed completely empty of cows, and the fodder lies in the infected shed. He did little in the way of disinfection. Panter never completely cleared his cows out, but lime-whited his premises; he has kept some of the cows there. French never completely cleared his shed of cows, but used abundance of chloride of lime in his shed, but that did not save him. Mosey did the same, and Liddiard the same again. He used no disinfectants, and he kept buying in all the time. Of the 13 who had no outbreak amongst the fresh cattle bought in, nine emptied their sheds of cows entirely, and disinfected them thoroughly before introducing fresh cows, and none of those nine had a fresh outbreak.

4992. The disinfectants used were principally chloride of lime?—Yes; there were four which did

not empty their sheds completely, but merely used disinfectants. Of those who emptied their sheds before disinfection, and then disinfected with chloride of lime, no new cases have occurred among cows newly brought in. Of nine who did not empty their sheds before disinfection, five have had a recurrence of the disease in the fresh stock. But the only fair instances of course are those who did empty their sheds before disinfection, and out of those not a single one has had the disease again.

4993. For what time did they keep their sheds empty?—A very variable time. Some of them a month or two.

4994. Did they use the chloride of lime everywhere, on the floors and ceilings, and all about the sheds?—I think they did, but that was all done under Mr. Murray's superintendence; I believe he saw to it.

4995. Have you ever known any case of a shed in which the disease was spreading in which it appears to have been stopped by the use of disinfectants?—No; not by simple disinfectants.

4996. Have you ever known a case in which it seems to have been stopped at all?—I know one instance in which a cow has remained throughout the attack in the shed, and has never been attacked, being apparently insusceptible of the disease.

4997. Was that an English or a foreign cow?—An English cow.

4998. You do not know of any case of a large shed containing 20 or 30 cows where the disease having appeared, and the cows not having been removed, the disease has stopped, after killing three or four of them, disinfectants having been used?—No. The disease seems, as a rule, to have gone through the whole, and if it has left one or two it has only been one or two that it has left.

4999. Are you satisfied with the condition of the slaughter-houses in Islington, and the powers that you have of keeping them in order?—I am pretty well satisfied with their condition. I think it is desirable that some regulation should be laid down by authority as to the periods at which lime-whiting is to take place, and so forth. At present we can only compel amendments (except when a nuisance arises) at the periods of licensing, and then we have to do it under a threat of opposing the licence.

5000. What you want is a positive power?—Yes; we want a positive power.

5001. With regard to the sale of the meat of animals which have died of the Cattle Plague, have you yourself traced any bad effects to human health from it?—No.

5002. Have you inquired into that point?—I have not had any opportunity of doing so. It is difficult to tell when meat is on sale whether it is derived from a beast that has died of the Cattle Plague or not; and again it is difficult to tell whether any meat that a person has bought is derived from a Cattle Plague beast. The difficulties of tracing diseased meat into human consumption are amazing to any one who has not tried it.

5003. Therefore you would not like to say that it was not injurious; you say merely that you have not traced it?—I should not like to commit myself to an opinion that it was not injurious, and at the same time I should not like to commit myself to the opposite opinion without proof, assuming the question to relate to my own experience.

5004. No sudden cases of disease have occurred which you thought might be traceable to the use of diseased meat?—No.

5005. Nor to the use of milk from a diseased cow?—No.

5006. I did not quite catch what you meant to imply when you were speaking of the sheds in the same yard; you cited the cases of several sheds in the same yard, did you not?—Yes.

5007. Those were cases in which the sheds were attacked at the same time?—Yes; or thereabouts.

5008. Owing to the introduction of the disease into one shed?—Yes; apparently.

5009. How do you think the disease spread to the other sheds in the yard?—I cannot tell; the sheds were contiguous; some immediately abutting the one on the other. In the case of Huckett and Grant, for example, they almost formed part of one shed. You passed from the door of one shed to the door of the other. In some cases the sheds were at the extremity of a yard, as in the cases of Pym, and Pecket and Lowther. Pym's shed is in the middle of a large mews, and Pecket and Lowther's at the end of the mews; both those sheds were attacked at the same time; but that is an instance where the water supply is derived from a well in the yard, that is to say, in the mews, and the water might therefore have been one means of communication.

5010. Have there been cases of this kind at Islington, that in some instances the disease has passed slowly through a cowshed, attacking cow after cow, rather at intervals, and others in which it has attacked them all at once?—Yes; but Mr. Murray will be able to give you more information about that than I can, as he has visited the sheds from day to day.

5011. (*To Mr. Murray.*) Have there been any cowsheds through which the Cattle Plague has passed in which there has been a difference in the rapidity of the transmission of the disease from animal to animal, in some cases the transmission occurring slowly, and in others very rapidly?—Yes.

5012. How would you account for that?—I should say that it results from the peculiar susceptibility of some animals to take the disease more readily than others.

5013. You would not attribute it either to a difference in ventilation, or in cubic space, or in water supply?—Not exclusively.

5014. (*To Dr. Ballard.*) The great point which I wished to know was whether the disease has not been propagated in those rapid attacks by means of the water?—I will take a memorandum of that question, and make inquiries.

5015. With regard to the removal of the hides and the manure which were not disinfected at Belle Isle; was that after the Orders in Council appeared directing their disinfection?—Yes.

5016. The orders existed, but they were not carried out?—Exactly; they were not carried out until I took the matter into my own hands.

5017. Can you give us any information with regard to the disposal in the cowsheds of the manure which comes from the animals that have been suffering from the Cattle Plague?—In all the cattle sheds in my parish the dung is kept somewhere on the premises for a period varying from three days to a week, until it can be removed by the contractor. In most of the establishments the dung is stored in the yard in a dung pit; but in 12 of them, from various reasons, partly from the situation of the cowshed, and the absence of a yard, and so forth, it is stored within the cowshed itself. In 10 of those cases in which it is stored within the shed itself the Cattle Plague has appeared, and in two only have the sheds escaped. In one of those two cases the cowkeeper sent away his cows altogether from the shed, so that they were not exposed to that source of disease.

5018. You trace a very manifest effect to the retention of the manure?—Yes. You will see the facts if you look at the table which I have handed in. The cross in that column signifies "dung in the shed." I think that speaks for itself; and I may state that I observed a similar relation between the attacks and the storing of manure in 1857, with regard to the lung disease. I found that it had a bearing also as regards the lung disease. In 41 sheds, in which at that time dung was not stored in the sheds, I got information as to 31 sheds as regards the disease. I found that eight had cases of the disease, and 23 had no cases; whereas, on the other hand, out of 12 sheds in which the dung was stored in the shed, eight had cases of the disease (in one case I could obtain no information), so that eight sheds of each kind had cases of the disease; but in the one case it was eight

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out of 31; in the other case it was eight out of eleven; therefore I conclude that the retention of the dung seems to have a bearing upon, at any rate, the occurrence of two kinds of disease, and that would lead me to suppose that the retained dung did not generate the specific cause of the disease in this case, but merely acted as affecting the general health of the cows, and thus predisposing them to suffer from the poison accidentally introduced.

5019. Will you allow me to ask you whether you have seen any evidence of the disease being carried by persons in attendance upon the sick cows?—I can tell you this, that Mr. Murray, our inspector, who is here, and another gentleman who has been appointed to inspect the sheds, a Mr. Chipperfield, a surgeon, went from shed to shed almost daily; and though that has been done up to the present time, a large number of sheds, 21 or 22 sheds, have never been attacked at all. If they could have carried the disease it must have been carried into all the sheds nearly every day, but they have never taken it. The disease spread apparently independently of the visits of our inspectors. I may say that they have been careful; they have not gone straight from an infected shed to another that was free from disease.

5020. They have taken some precautions; they have remained outside the sheds, or taken care not to touch the beast?—Yes; they have gone to the infected sheds last, and taken precautions of that kind. Mr. Murray will be able to explain it better than I can.

5021. (*To Mr. Murray.*) What precautions did you take?—I have made it a rule never to touch diseased animals in any shed; and also I have made it a general rule, not absolutely a particular one at first, but latterly I have made it a particular rule, not to go into a shed where I knew that no disease has been, if I have been previously into an infected shed.

5022. Have you used disinfectants at all on your own person?—No.

5023. Have you cleaned your boots, or taken any trouble in that way?—I have generally wiped my feet as clean as I possibly could whenever I have left a shed.

5024. Have you known any instances of the disease being carried by hides?—Not of my own knowledge.

5025. (*To Dr. Ballard*). Have you any information to give as regards Belle Isle?—I can put in a paper showing the number of cows received alive and dead at each of the establishments each month at Belle Isle, and the number received from Low's lairs. Now Low's lairs, at Belle Isle, is a place where cattle stand prior to the market, so that it may be assumed that all the cases that went from Low's lairs to the knackeries were cows that were on their way for sale at the market, and died before they got there.

5026. Were there a large number that went from Low's lairs to the knackeries?—113.

5027. What is the date of that?—The numbers in the various months are these; in July, 8; in August, 64; in September, 21; in October, 16; and in November, 4.

5028. Mr. Low was the person who sold the first cows that were attacked to Mrs. Nicholls, I believe?—I cannot say that.

5029. (*To Mr. Murray.*) Do you know whether that was so or not?—Mrs. Nicholls has informed me that as a rule she buys her cows from Mr. Low.

Dr. Ballard.—I have a return here of the cows received each day into the knackeries at Belle Isle, which I can hand in if it will be of any use. It appears that almost all the animals that went to the knackeries were cows. There were three bulls, two heifers, and four calves, but all the rest were cows out of the 663.

5030. (*Mr. Read.*) You have stated that in some cases two or three cows in a shed had escaped the Plague; do you mean that they have recovered, or that they have escaped the infection altogether?—Some have recovered. In two cases I know of they have recovered, but here and there there seems to be a cow that is insusceptible.

5031. You have not noticed whether in those two or three instances they have had a slight indisposition of any sort?—No; perhaps Mr. Murray will be able to tell you more about it.

Mr. Murray.—In only one case that I know of has a cow not exhibited any indisposition; that was at Dennison's.

5032. Have you noticed any cases in which they have had only a very slight attack of Plague?—Yes.

5033. Have you noticed that in those cases there has been any eruption of any sort?—No; there was no indication beyond this, that the animal was evidently dull and dispirited, and that the milk secretion had lessened. As a rule, those cases never went on to anything very extensive in the way of disease. In one very light instance the animal recovered.

5034. Can you give the Commission any idea of the per-centage of those mild cases?—The mild cases would be somewhere about six or seven per cent., as nearly as I can tell.

5035. There is nothing very remarkable in the carcase of a bullock being passed for human food at the diseased slaughter-houses in the Metropolitan Market, is there?—I really do not know myself, beyond that I have seen it pass there. I do not know whether it is the general rule to pass it.

5036. You are not aware that it is the general rule to kill a beast which is supposed to be diseased in the slaughter-house and then if the carcase of the beast is supposed to be fit for human food to pass it for that purpose?—I only like to state what I have actually seen, and that is, that in two instances where the animals were diseased, from the money which the proprietors got I have every reason to believe that the carcases must have been passed as fit for the market.

5037. You did not see the meat?—Yes; I saw the meat.

5038. Do you think that the carcase presented any apparance of being unfit for human food?—The carcase did not present any such appearance; it was only from knowing that the animals had had the disease beforehand, and from an examination of the viscera, that there was undoubted evidence of the disease, but not to any great extent. I must say that if the carcasses only had been shown to me I should not have been able to tell, had I not previously known the fact, and had I not seen the intestines and other viscera, that the animals had had the Plague.

5039. (*Mr. Ceely.*) You remarked that neither in the cows that recovered without any symptoms of indisposition, nor in those that had had the disease, but lightly, had you observed any eruptions. May I ask whether any eruption was looked for?—I did not look for eruption. I simply saw that the animal was indisposed.

5040. You are probably not aware that eruption has been noticed in the case of animals slightly affected, and in others even in convalescence?—Yes; I believe that to be the case; it is so stated.

5041. You have not seen it?—I cannot speak from my own knowledge, because I have not examined animals so slightly affected.

5042. And you have not observed in others in convalescence any eruption about the thin parts of the skin; the arms, or the neck, or the jaw?—No.

5043. You have not looked for it?—No; I have not looked for it.

5044. (*Mr. Lowe.*) (*To Dr. Ballard.*) Do I understand you to say that you have something you can tell us about the origin of the disease with regard to cows?—I can state the facts with regard to the outbreak in Mrs. Nicholls's shed, which was the origin of it in Islington.

5045. Did you not say that you could tell us something about it?—I have told all that I can tell. I have nothing additional to say.

The witnesses withdrew.

JOHN WHITMORE, Esquire, M.D., examined.

5046. (*Chairman.*) I think you are the medical officer of health in St. Marylebone ?—I am.

5047. Will you state to the Commission whether you have been able to trace the origin of the Cattle Plague in Marylebone in many cases ?—I think I have. I think I have been able to trace the first outbreak of the disease in the parish. I have taken some trouble to inquire, and the result of my inquiries is that a Mr. Drewell, a cowkeeper, who generally has about 80 cows within the limits of Marylebone, and who has two sheds, one in Beaumont Mews and another in Little Marylebone Street, purchased on the 19th of June four Dutch cows and one English cow at the Cattle Market. The four Dutch cows went to the shed in Beaumont Mews; the English cow went to the shed in Little Marylebone Street. On the 24th of that month, that is, five days after the purchase of the English cow, she showed symptoms of disease; that was the cow that went to the shed in Little Marylebone Street. All the cows were purchased on the 19th of June, and on the 27th of the same month the disease was general in that shed.

5048. (*Dr. Parkes.*) The disease was general in the shed where the English cow went ?—Yes. I should state that the English cow originally came from Edmonton, but had been taken to the market to be sold. With regard to the disease in the other shed to which the four Dutch cows had been taken, it did not appear until the 13th of July; it broke out first with those Dutch cows, and then extended to pretty nearly the whole of the rest of the herd in that shed. That was the large shed. But it is very clear from what I have ascertained that the disease was taken from the shed where the English cow was placed by the cowkeeper's men, who were employed on both sheds. The disease which had broken out in the larger shed on the 13th of July, that is, nearly a month after the former case had occurred in the other shed, was communicated by the men who went from one shed to the other.

5049. (*Chairman.*) Then it is your opinion that the disease was communicated to the cowsheds in your district from the market ?—Yes; in the first case of the disease. I have taken some trouble to ascertain when the first outbreak took place, and I find that that was the first case. Simultaneously with that outbreak another cowkeeper of the name of Rice purchased some cows on the same day, the 19th of June, which were taken to his shed, and on the 25th of that month the disease broke out in his shed.

5050. Did those animals belong to the same lot in the market as the others you have spoken of ?—That I do not know; but it is important to observe that the disease occurred in the shed which the English cow was taken to, and it would appear from that that the English cow had got the disease, and was incubating it; but it does not appear so plain that the Dutch cows were, because where the Dutch cows were the disease did not break out until nearly a month afterwards; but where the English cow was, that particular cow was attacked on the 24th, and all the herd were infected two or three days afterwards.

5051. Is it your opinion that the state of the dairies in your district was such as to create the disease of themselves; to generate it ?—Certainly not. My experience is that the disease in Marylebone has raged most in those sheds where the greatest attention to ventilation, cleaning, and sanitary arrangements generally, had been observed. It is a curious fact that in some of the largest and best ventilated sheds in the parish the disease has been very prevalent; whilst in small, close, confined sheds the disease, though it has broken out, has only broken out lately, and not quite in so virulent a form apparently. I may say, as the result of some trouble that I have taken, I find that where there have been the largest number of cows the disease seems to have been more rapidly propagated, if I may so speak, than where there were a smaller number. In the parish there are now (that is, last week, according to the last return I have seen), only seven sheds in which the disease has not appeared; but every one of those is a small shed where not more than five or six, or at the utmost seven, cows are kept; whilst in sheds where 80 or up to 140 cows are kept it has been most prevalent.

5052. In those small sheds that have escaped the disease have any new cows been introduced from the market ?—No; no new cows.

5053. The proprietors have not purchased fresh stock ?—No; they have acted upon the advice that I have given to them, not to purchase.

5054. Have you many slaughter-houses in your district ?—95; but at 41 of them only are cattle killed; the other 54 are used for the killing of sheep, pigs, and lambs. But I should state that, though there are that number of slaughter-houses, in a very large proportion of them there is very little cattle killed. The owners take out a licence for a slaughter-house, supposing it possible that they may require to have one, and many of them at certain periods of the year perhaps use them, but they do not all invariably use their slaughter-houses.

5055. Do you believe that the existence of these private slaughter-houses tends to the spreading of contagious disorders among cattle ?—I have no evidence of that fact whatever.

5056. Does it not enable cowkeepers to make away with diseased cows in an early stage more readily ?—I have endeavoured to obtain information upon that point, and I have instructed my inspectors to watch carefully those slaughter-houses, with a view to ascertaining whether diseased cattle have been killed, but in no instance have I found that it has been done.

5057. Have the cowsheds very much improved in condition in the last few years in your district ?—Yes, they have improved lately. But I may state that the sanitary regulations for the cowsheds in my district have been generally of a very efficient character. I heard Dr. Ballard give the amount of cubic space which was in some instances allowed for the cows in the Islington district. Now in the parish of Marylebone we have a set of rules, of which I have a copy here, which are approved by myself and adopted by the vestry, and which the licensing magistrates require to be carried out previous to granting a renewal of a licence. Those rules provide that "every "cowhouse shall have a space of at least eight feet "by four feet for a single cow, or a space of at least "eight feet by seven feet for two cows (when kept "in pairs), each cow to have a breathing space of at "least 1,000 cubic feet, the cowhouse to be properly "lighted and ventilated; and in all cases where there "are inhabited rooms above cowhouses, or when the "sanitary state of the neighbourhood requires it, to "be provided with tight roofs and ventilating shafts, "so as to convey the noxious exhalations above the "level of the adjacent houses." I may state that on every application for a licence for a new cowhouse, the first thing my inspectors do is to ascertain the amount of cubic space the cowhouse contains, and according to the cubic space, and the superficial space also, a licence is granted for a number of cows; and no licence is granted without it.*

* The following letter was subsequently addressed to the Secretary by Dr. Whitmore:—

Sir, 15, Wimpole-street, December 15.

In my evidence before the Cattle Plague Commissioners on the 7th inst., I omitted to state a fact which I should like to have, if possible, added to it.

In reference to the mode in which cows are kept in London sheds, the plan very generally adopted is to place two cows in one stall, the width of which does not exceed 6 feet or 6 feet 6 in.; this I consider objectionable, and to some extent cruel. In such a confined space it is quite impossible for both animals to lie down together in comfort. I have often seen them both in a recumbent position, but in attitudes so confined and cramped as to afford them anything but rest, and when they get up it is

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5058. Has the disease been more or less violent in the cases of sheds where those regulations have been attended to?—I cannot say that I have discovered that the disease has been less violent in well-ventilated sheds than in others. If I were to express an opinion at all I should be rather inclined to say that a large amount of ventilation has been rather unfavourable than otherwise, for some of the cow-keepers have told me that where there has been a great amount of ventilation they have had a great deal of the lung disease, and where the lung disease has prevailed the cattle disease has also prevailed; so that really in some of the best ventilated sheds the disease has been most prevalent. In others, not so well ventilated, the disease has not broken out so soon, and has not been so generally prevalent.

5059. Have there been any difficulties in your district with regard to the disposal of the carcases of the diseased animals?—I think not. That has been under the care of the inspector appointed by the Privy Council. I have not heard of any difficulties. A great many of the carcases have been sent to Belle Isle, the place where these carcases are disposed of; but in the very large majority of cases where the disease has broken out, the cowkeeper has had the wisdom, I should say, to get rid of his cows altogether before the disease had attacked them.

5060. I think I understood that there were hardly any cases of disease at all in Marylebone at one time?—Yes; there was an immunity, or something like it. From the 30th September until the 29th of October, with one exception only, no fresh case of disease had broken out in the parish during that time; but since then the disease has appeared again in some five or six sheds. I have not been able to ascertain how it got there.

5061. Has that been in sheds where there have been new purchases?—Yes.

5062. And sheds where the disease had been before? Yes, decidedly; but in this particular shed of Mr. Drewell, where the disease was so very virulent, and where out of 90 cows he lost 80, the shed was very carefully and very admirably well cleansed, purified, and ventilated; the whole building was washed in hot lime, and scraped, and the whole of the pavement was removed and replaced, and everything was done that could be done to remove every possible trace or taint of the disease. Since then he has imported into his shed some 20 fresh cows. They have been there a month or upwards, and up to the present time no new case of disease has appeared; but he has taken the most stringent precautions to prevent anything like the infection being carried. He allows no person whatever to enter his shed, and the cows that he purchases are placed in quarantine. If he purchases cows, as he does generally, at the place of debarkation, he brings them home in his own van, and places them in quarantine for a fortnight before putting them with his other cows. They undergo the quarantine in another shed. If they pass through that period safely, they are then admitted to be with his other cows. That has been going on for six weeks now, and up to this time he has not had any fresh outbreak.

5063. Has he bought lately any foreign cows?—Yes; within the last week he told me that he had purchased some.

5064. (*Dr. Quain.*) How many cows were there in the sheds in your district when the disease first made its appearance, and how many are there now?—1315 was the number of cows for which licences were granted, and there were in fact that number when the disease broke out. 700 cows, to my knowledge, have been attacked with the disease, and 300 have died in the sheds. There are at present in the sheds 340, and the recoveries, I think, are somewhere about nine or ten per cent.

5065. With regard to the propagation of the disease, have you any striking illustration of its being carried by persons from place to place?—I am afraid I am a personal illustration of that. When the disease first broke out I was anxious to know something of it, and fearing that it might be prejudicial to the health of children who drank milk, I made it my special business to investigate the disease, and went from shed to shed, and unfortunately, from beast to beast, and examined them carefully for that purpose; but I found that the disease followed in my track. In those several sheds which I had visited, five or six days after I had been to them, and where I had reason to believe that no one else had been, the disease broke out. I may state that I have had no instance of any cow having been kept in an infected shed during the time that other cows in the shed have been attacked with the disease, and not having had it. I know of cows having had the disease, and recovered; but I have no case of a cow not having had it that was left in a shed in which other cows were attacked.

5066. You have had no case of a cow escaping which was left in an infected shed?—No; of course many were taken away before they had it, but the fate of those cows I do not know. I made it my business to inquire into the fact of the escape of cows in an infected shed, and not a single instance has come within my knowledge, or within the knowledge of my inspectors, where the cow has remained in a shed where the disease existed free from the disease, and which remains there now.

5067. Have you had any complaints from the people in the neighbourhood of these sheds of their being injurious to their health?—Yes; I constantly have complaints made to me in my capacity as medical officer of health of the disagreeable effluvia from the cowsheds; that is in the crowded localities. Many of the sheds in Marylebone are in the worst and most crowded localities. Take, for instance, Lisson Grove, which is a densely populated locality, where there are a large number of persons living in courts. Those who live in the neighbourhood of the sheds experience inconvenience from them there. I think I may say, as the result of some investigation I have made, that the health of those people is to some extent (I cannot say to any great extent) affected. I think I trace indications of fevers and diseases of that class prevailing more in the vicinity of the cow-sheds than at some distance from them.

5068. Is that the case even if the cowsheds are kept clean?—Unfortunately in those localities they are not kept clean. They are instances of cowsheds being badly kept.

5069. The magistrates have the power of refusing the licences?—Yes.

5070. Do they do so?—On the last occasion I recommended the magistrates to refuse the licence in two cases, and they did so.

5071. If I understand you rightly, the cowsheds in open parts of towns are not in your opinion very objectionable?—No, I think not.

5072. So far as the injury to the public health is concerned, you would not think it imperative to compel the removal of cowsheds to country districts?—No; but those in confined spaces and narrow ought to be removed to more open spaces; and I would have regulations imposed for the entire arrangement of the cowsheds. The regulations now in force for the sanitary arrangements of the cowsheds are arbitrary; it depends upon what the vestries think proper to advise. Now, I think some Government regulations as to the cubic space, the frequency of

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with great struggling and difficulty. The cowkeepers give as a reason for keeping two cows in a stall that they feed and thrive better. If such is the case then I think the width of each stall should not be less than 8 feet.

I am,
Sir,
Your obedient servant,
J. Whitmore.

M. Bernard, Esq.

P.S.—I may add, that I made a report to the foregoing effect to the Marylebone Vestry, which was placed before the Licensing Magistrates on the recent granting of licences to cow and slaughter houses.

washing out the sheds, and the removal of the manure, should be published, and the cowkeepers should be compelled to observe them.

5073. Those regulations should, in your opinion, be drawn up by some central authority ?—I think so.

5074. Either the Government or the Metropolitan Board of Works ?—I think the Government. I think there ought to be uniformity.

5075. As to the milk which has come from the country, as compared with the milk of cows kept in London, do you think there is anything preferable in the one or injurious in the other ?—I have examined some 40 different samples of milk, partly from the town and partly from the country, and the result I have arrived at is that the town cows produced a better and richer milk than the country cows.

5076. Do you mean richer in the cream ?—Richer in cream and caseine.

5077. Would you say that it was absolutely richer milk and more wholesome milk ?—I do not know about its being more wholesome, but it is certainly the fact that it is richer. I have the results of several analyses which I have made of the milk taken from different dairies in the parish, and also the results of analyses of some milk from cows in the country. I should tell you that in all the dairies a very large proportion of the milk now supplied comes from the country. Not more than a fifth of the milk consumed in London at present is obtained from the London cows; that is the case, at least, as far as regards Marylebone. I have endeavoured to ascertain the richness or the quantity of nutritive constituents contained in the country and town milk respectively. I have here a memorandum of the results. No. 1. is country milk, at a specific gravity of 1026, a weight of serum 1027, with a per-centage of cream 14, and weight of dried curd, 87 grains.

5078. Will you hand in that table of results ?—Yes; but I have some to add to it first. The result of it all is that as a rule the London milk is the best; there is a greater per-centage in it of cream, and a greater weight of dried curd. Of course the specific gravity of the serum, or the whey, is a little greater in these; that, I apprehend, is in consequence of the specific gravity of the cream being lighter.

5079. Those are selected specimens that you have taken; do you believe that the quality of the milk supplied to the public is as good as those figures would represent it to be ?—These specimens were indiscriminately purchased. The milk supplied to the public now I am afraid is not quite so good, because those who have the selling of it dilute it.

5080. In your opinion there is no objection to well-placed cowhouses in London ?—No.

5081. As to slaughter-houses, there are a great many in your district, are there not ?—Yes.

5082. Are they offensive ?—No; they are exceedingly well kept, and the regulations imposed upon the proprietors of the slaughter-houses are such as to render it impossible for them to be otherwise. For instance, if an ox is killed to-day, the refuse, the blood, and so forth, must be removed to-morrow morning.

5083. Where is it taken to ?—The blood is sold for manufacturing purposes.

5084. What becomes of the other refuse ?—It goes perhaps to the nearest dung heap, but in my parish the dung heaps are removed three times a week.

5085. It has to be carried away or sent down the sewers ?—No blood is allowed to pass down the sewers; some liquid may perhaps pass down, but not blood.

5086. Have you examined into the character of the meat brought from the country and the meat slaughtered in London ?—Not personally. Mr. Way, who is in attendance, can give you information upon that point.

5087. (*Dr. Parkes.*) You say that Mr. Drewell bought a cow on the 19th of June in the market, and that Mr. Rice bought a cow on the same day, the 19th of June, in the market, and that Mr. Drewell's cow was attacked on the 27th of June ?—No; on the 24th.

5088. When was Mr. Rice's cow attacked ?—On the 25th.

5089. Were those the first cases that occurred in Marylebone ?—They are the first cases in Marylebone; I think I may confidently say that that was so.

5090. Was Mr. Rice's cow an English cow ?—No; his cows were Dutch cows; the first cow in Mr. Rice's place that was attacked was a Dutch cow.

5091. Mr. Drewell's was an English cow ?—Yes.

5092. They had both been purchased in the market ?—Yes.

5093. With regard to your comparison between town and country milk, I presume your town milk was taken direct from the dairy; from the cowshed ?—It was milked from the cow, and given to my messenger.

5094. The country milk was taken as supplied in a shop in London, I suppose ?—Yes; but upon the faith of the cowman, who I believe would not deceive me upon the point, that it was exactly as it had come from the country.

5095. 1,026 is rather a low specific gravity for country milk, is it not ?—Yes; but allow me to say that when there is an increase in the quantity of cream there is a diminution in the specific gravity.

5096. But even then your serum ought to be more ? Yes; it is more.

5097. It seems rather doubtful whether water had not been added ?—I do not think it had. In some of the milk which I have examined the specific gravity was lower than that, and at the time when the Lancet Commission made their examinations it was found that there were some very excellent samples of milk in which the specific gravity of the milk was as low as 21, and the specific gravity of the serum 23, and the cream 18 per cent. I have taken some pains to ascertain the correctness of the figures I have in this table.

5098. Do you at all believe that in any case the disease has originated spontaneously in Marylebone ?—Certainly not.

5099. Have you in every case been able to trace the introduction, or the possibility of the disease having arisen in an infected shed ?—Where it has been necessary to investigate, where anything like a doubt has been thrown upon the subject, I have investigated it, and I have traced contagion always.

5100. You have yourself traced contagion ?—Yes.

5101. (*Mr. Ceely.*) I think you said that you took some pains to investigate the character and nature of the disease when it first occurred ?—I did, in the first instance.

5102. Have you formed any opinion as to the form of it, whether it is typhoid or otherwise ?—I think it is fever of a low type.

5103. You do not think it eruptive ?—No.

5104. Have you seen no eruption ?—No.

5105. Have you looked for it ?—No.

5106. Have you seen no eruption in convalescent animals ?—No.

5107. Are you not aware that it has been observed ?—I have heard so. One of the symptoms which I have seen, and which has not been generally remarked upon, is that in the first stage of the disease I have observed the inflamed condition of the vagina.

5108. Have you seen any eruption about the thin parts of the skin on the arms or the neck ?—No.

5109. Not in the cases of animals that have recovered ?—No; my attention has not been specially directed to those points.

5110. (*Chairman.*) Is there anything else of importance which you wish to bring before the Commission ?—I think not. I have stated everything, except that I have quite come to the conclusion in my own mind that this is the most contagious disease that we have ever heard of, and that it is communicated entirely by contagion.

5111. (*Mr. Ceely.*) Did you ever know a case of a typhus or a typhoid fever communicated in the way

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in which this is communicated? Do you think any of our fevers, except the eruptive fevers, are communicated with such facility and such intensity as this is?—No; I may say as regards fevers that we generally find that post-mortem appearances show certain glands called Peyer's glands diseased or ulcerated. I have seen the dissections of animals that have died from this disease in which there has not been the slightest affection of the glands.

5112. That you have observed?—Yes; whilst on the contrary in some of Mr. Way's healthiest and best cows I have seen the Peyer's glands in a chronic state of disease.

5113. (*Chairman.*) Have you seen much of the different modes of treatment in Marylebone?—Yes; I have seen several plans, but I never saw the slightest beneficial results from any one of them.

The witness withdrew.

THOMAS HILLIER, Esq., M.D., examined.

T. Hillier, Esq., M.D.

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5114 (*Chairman.*) You are I think the medical officer of health in St. Pancras?—I am.

5115. Would you state when the first cases of the Cattle Plague broke out in your district of St. Pancras?—I have not been able to define the exact date, but it was very early in July, as far as I can ascertain; in the shed of a man of the name of Smith of College Street West, Camden Town, who bought a Dutch cow in the Metropolitan Market. This cow fell ill within a very short period, but he cannot define exactly the date. Of the remainder of his stock, five in number, four fell ill almost at the same time; so nearly that he cannot define the dates. He has kept no memoranda, but they all died, with the exception of one, within a week of his having purchased the stock; and very nearly at the same time other cases occurred the origin of which I was not able so well to trace. It was at the period when the thing was kept very quiet among the cowkeepers, and all was done by stealth.

5116. But these were not such early cases as those which you have heard spoken of by the former witnesses?—There were none so early as either the cases in Islington or in Marylebone. They must have been a few days later.

5117. Do you believe that the disease could have been generated in the cowsheds themselves in your neighbourhood without contagion?—I have no reason to think so. My experience is quite in the opposite direction. Very many of the best sheds in the district have suffered extremely, and some very bad sheds have escaped up to the present time.

5118. In what condition are the sheds, generally speaking, in St. Pancras?—We have some of all kinds. There are some very good, some very bad, and some of moderate quality.

5119. Has there been any improvement of late years since the licensing system was introduced?—Yes; there has been a very decided improvement as compared with the state of things five years ago.

5120. Are there similar regulations in force in your district to those which have been mentioned by Dr. Ballard and Dr. Whitmore?—Yes; we have similar regulations, but we have great difficulty in enforcing those regulations; the poverty of the cowkeepers is taken into consideration very much, and personal considerations are often allowed to have great weight. I may observe that there is no one whose duty it is to prevent a cowkeeper from keeping cows without a licence. It is no one's positive duty. There is no prosecutor named in that section of the Act of Parliament.

5121. Is it not the duty of the police to inquire into it?—No; it is not the duty of the police. I have represented to my board that I thought a memorial should be made to the Government or to some authorities on the subject urging the propriety of the police being the prosecutors.

5122. In the cases of those sheds which have been exempt from the disease, can you trace any reason for the exemption?—There are 36 sheds in which the disease has not made its appearance, out of about 100 in the parish. The only thing that those sheds have in common that I can ascertain is that no new cows have been put into them. There are some very good and some very bad that have escaped; but none in which a large number of cows have been kept have escaped. The largest number kept in a shed which has escaped was 30; there have been some of 25 or of 20 and smaller numbers; but all the largest sheds have suffered; and the only point common to all that have escaped is that the owners have not bought stock, and for the most part that they have observed very strict precautions as to the admission of strangers.

5123. Have you made particular inquiries as to the cause of the immunity in those 36 sheds that you have mentioned?—So far as to ascertain that no new stock has been bought. I have not gone beyond that in my inquiries as regards very many of them.

5124. Have you a great number of slaughter-houses in your district?—I think there are 98 slaughter-houses in the parish.

5125. Do you consider that the existence of those slaughter-houses tends in any way to prevent the discovery of contagious disorders?—It prevents the discovery of diseased meat. I think it gives facilities for the disposal of diseased meat as human food. I know that during the earlier period of the disease raging in London, the great majority of the cattle were disposed of for human food. All that did not die very rapidly were disposed of in that way.

5126. Were they slaughtered at those private slaughter-houses?—It is impossible to say where they were slaughtered. That is the difficulty in the matter. These slaughter-houses are so numerous that it is difficult to trace them. I do not think that many of them were slaughtered in our parish, because we kept a very careful watch. I think that a great many went to the east end of London. Of course each parish tries to throw it on to its neighbours. It is impossible to thoroughly inspect the slaughter-houses at the time of slaughtering in consequence of their number.

5127. You would be in favour of diminishing the number of those slaughter-houses, and having certain specified ones?—Yes. I know that different districts vary very much in the strictness with which they require the regulations to be carried out, and the salesmen soon find out the districts in which the regulations are relaxed, and to those districts the diseased animals are sent.

5128. Where the regulations are strict and thoroughly enforced the disease can very readily be detected in the carcase, can it not?—If the viscera of the animal are inspected it can be detected, but not otherwise. It is very important that the carcases of the animals should be inspected at the time of their being slaughtered in order that all the viscera may be seen.

5129. (*Dr. Quain.*) Have you any suggestion to make yourself with regard to the slaughter-houses or cowsheds?—With reference to the licensing of the cowsheds, I do not think that the system works well, for the same reason that I have mentioned with regard to the slaughter-houses, that the principles which guide the local boards in different parts of the metropolis vary so much, some being very strict and others very lax. I know one district in which unlicensed cowhouses have been suffered to be established, and now exist. There are some five or six such cowhouses in one of the most crowded districts of London in which cows are kept; and although the medical officer has represented the desirability of instituting prosecutions, there is no one whose duty it is, or at any rate who considers it to be his duty, to prosecute.

5130. (*Dr. Parkes.*) Do you consider it advisable to remove the cowhouses from London?—From all the more crowded districts. I do not think it necessary to remove them from all the Metropolitan Police

District, because there are parts even of St. Pancras where cows may be kept quite as well as anywhere within 20 miles of London.

5131. In comparatively open spaces ?—Yes; there are some comparatively open spaces.

5132. Those spaces might, however, be built upon at some future time ?—Yes; there should be regulations as to the neighbourhood of houses and highways.

5133. If those spaces were built upon they would become unsuitable for cowsheds ?—Yes.

5134. Have you been able to trace any effect of the diseased meat upon the health of the people who have eaten it ?—No; I have not got any facts upon that subject.

5135. Have you any negative facts showing that the meat has been eaten without any bad effects ?—No; not more than that I know a great amount of meat has been eaten, and I have not heard of any bad effects.

5136. Have you any facts with regard to the milk from diseased animals ?—I have not got any facts about that. The cowkeepers state that they throw the milk from diseased cows away. The only fear, I think, is in regard to the cases in which the cows recover, because the milk is said to come back again very soon. But that applies only to the few cases when a cow recovers. It is a very peculiar feature in the disease, what a rapid course it runs, and how soon the animal is restored.

5137. The cows give more milk afterwards than before, do they not ?—I do not know that.

5138. (*Dr. Quain.*) Do you say that fat cattle are destroyed quickly, or do you speak only of cows ?—I speak of cows. I have had no experience of fat cattle.

5139. (*Dr. Parkes.*) Have you had any experience as to the best kind of disinfectants ?—No; I cannot say much upon that point. The chief one used has been chloride of lime. In some cases where cattle have been brought back to the sheds in which the disease had already been after they have been disinfected they have escaped. In one case the shed has been disused for two months, and then cattle have been brought back again, and the disease has broken out. In those cases it appears to be attributable to the previously infected state of the shed.

5140. Had disinfectants been used there ?—Yes.

5141. Had they been properly used ?—Yes; it was stated so; but I have no personal knowledge of that.

5142. (*Mr. Ceely.*) Have you paid any attention to the pathology of the cattle disease ?—I have seen a certain number of dissections.

5143. Have you formed any idea of the character of the disease from its pathology ?—It appears to me to be a disease sui generis.

5144. Do you think it approaches to an eruptive fever ?—I think it is more of that character, a great deal, than typhoid. I do not think it has any relation at all to typhoid fever. It resembles typhus in being a very depressing disease, but not otherwise. *T. Hillier, Esq. M.D.* 7 Dec. 1865

5145. You see no reason for thinking it to be of a typhus or typhoid character ?—I see no relation to those diseases. The anatomical character of it is very different, also the course of the disease, and the circumstances with respect to contagion.

5146. You refer to the manner of its propagation ?—Yes; the manner of its propagation by contagion.

5147. Have you seen any eruption succeed the convalescence of an animal in the protracted cases of attack ?—Yes; in several cases I have seen an eruption near the vagina.

5148. Can you define the eruption ?—It has been papular, and red; there were small papules.

5149. Terminating in crusts ?—I have not watched them closely enough to say.

5150. But you observed the papular stage ?—Yes.

5151. Where was it ?—In the buttocks.

5152. Not upon the head and face and throat ?—I have not seen the papules there.

5153. You are satisfied of their being papules, not pustules ?—At the time I saw them it was papular certainly.

5154. That was not at an early stage of the disease ?—No; it was after the cow had been suffering for several days.

5155. You did not trace it to its conclusion in order to see whether it was papular or pustular ?—No, I did not.

5156. Did you not observe any incrustations afterwards on the surface of those papules ?—No; I cannot say that I did.

5157. You did not follow it up well ?—Not minutely.

5158. But in cases in which you observed the papules the disease was in a late stage ?—Yes; it was a late stage of the disease. I have noticed a redness of the vagina at an early period.

5159. Your opinion is, that the disease is of the nature of an eruptive fever ?—It seems to me to be more allied to the eruptive fevers than anything else.

5160. It is unlike typhus and typhoid in its manner of propagation ?—Yes; it is much more contagious, certainly, than typhus or typhoid.

5161. (*Chairman.*) Have you had any experience in the treatment of the disease at all ?—I cannot say that I have. I have heard of cows recovering upon every possible plan of treatment, and also of their dying upon every possible plan of treatment; but I have heard very few exact facts.

Mr. Thomas Benjamin Way examined.

5162. (*Chairman.*) I believe you are in a rather extensive business in London ?—Yes.

5163. As a butcher ?—Yes.

5164. Have you considered the subject of altering the mode of carrying on the butchers' trade in London, by turning it more into a dead meat trade ?—I have considered it, and to a certain extent carried it out into practice.

5165. Would you state the result of your experience ?—The amount of my outlay during the year in the dead meat market is considerably larger than that in the live meat market. My outlay in the last year was between 6,000*l.* and 7,000*l.* in the live meat market, and between 8,000*l.* and 9,000*l.* in the dead meat market. In former years, before we had the railways in operation, we slaughtered nearly double the quantity we do now.

5166. Do you consider that the trade in dead meat is increasing in London ?—Very largely.

5167. Do you find that the meat that comes from the country in this way is as good as the meat killed in London ?—I give it a decided preference in general; but not wholly, on account of the difficulty of keeping it. *Mr. T. B. Way*

5168. How do you account for the meat coming from the country being better than that killed in London ?—It is killed, I imagine, generally in a cooler state, and has not been subject to the excitement that a bullock undergoes in travelling by rail and attending the market, thereby, I think, so far as I have been able to ascertain, losing a portion of its nourishing quality.

5169. We were told by one witness that the meat that came up dead was only fit for a particular kind of consumers; that the consumers at the West End did not like the meat that came up by train; is that the case ?—I find it quite the contrary. I find that the country killed meat gives far greater satisfaction

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than the London killed meat. We have not to keep it so long by three or four days as the town killed meat.

5170. Can this business be carried on in the summer as well as in the winter months ?—No, it cannot.

5171. It cannot be carried on in the summer ?—No.

5172. Then it would be impossible to convert the whole meat trade for London into a dead meat trade altogether ?—Utterly impossible.

5173. I understand that in the winter it is probably the best way of doing it ?—Great inconvenience would arise from it, but I think it is practicable, certainly.

5174. Have you much experience of the slaughter-houses in the metropolis ?—I have seen a great many amongst the larger butchers.

5175. Do you consider that they are carried on in a satisfactory manner ?—I think so, so far as I have witnessed; there is great cleanliness in them. That has been the case of late years particularly.

5176. You are speaking of the slaughter-houses of the large butchers ?—Yes.

5177. Would your remark apply to the small slaughter-houses ?—Not to those where the slaughtering is carried on underground, which it is in some cases. I may say in a few cases; it is by no means general.

5178. Would you wish to see the system of slaughter-houses altered in any way ?—No ; I do not think that they could be improved upon.

5179. Do many animals in an early stage of disease find their way into those slaughter-houses ?—I think not.

5180. We are told that a great number of dairymen in London, directly they find they have a disease in their sheds, send the cows away for the purposes of slaughter ; do you think that that has been the case ?—I do not think so, to any extent. Certainly no respectable butcher would take in a cow under such circumstances.

5181. Then where do you think those cows went ?—I imagine they went principally to such places as Maiden Lane, Belle Isle, as it is called, and also into some of the lower neighbourhoods where they have small slaughter-houses. There is a certain class of butchers who would not be particular in taking them.

5182. Would great public inconvenience arise if there were only a certain number of regulated public slaughter houses where all animals should be slaughtered ?—Very great inconvenience, and great losses also. The trade itself would be subject to peculation, which we are now subject to to some extent.

5183. How so ?—From the very character of the men employed. The peculation takes place in the loss of fat. It is no unusual thing at the present time, even in the private slaughter-houses, to find a man taking away a quantity of fat under his smock frock, and everything of that kind is done.

5184. (*Dr. Quain.*) Your distinct impression is, that the flesh of oxen suffers considerably by lengthened journeys on railways ?—It depreciates in quality, and in weight also.

5185. How much is it dimished in weight ?—We calculate, and have pretty good authority for our calculation, that an ox will lose one stone a day (that is eight pounds a day) in its transmit, say from Scotland for instance to London. Of course that would apply still more to cattle driven by road.

5186. Are cattle in a more healthy and more profitable condition the nearer they are killed to the place of their pasture ?—More profitable to the sellers.

5187. But you think it would be quite impossible to accomplish the slaughter of animals near their pastures in summer time ?—I do.

5188. Suppose that an ox was in a pasture within five miles of a railway station 250 miles from London this morning, and he was killed there; could you not have his meat the next morning, and would it not be as good as the meat of animals that had come up alive and been killed in London ?—No ; we should not have his meat the next morning. In the summer months it would be scarcely cold, and if packed with any heat remaining in the body, the probability is that by the time it had arrived in London for the market it would be in a putrid state.

5189. That is as the arrangements for conveyance exist at present ; but if there was a more extensive dead meat market, which would encourage the railways to take proper precautions and proper means, the state of the case would be very much altered, would it not ?—I think the greatest expedition is used now by the railways that they possibly can, and yet they cannot deliver the present quantity of meat in proper time for the market; that is the case even with the quantity that comes at the present time.

5190. It is very large, is it not ?—Yes.

5191. In fact, at the present moment, the railway arrangements are deficient in supplying the means of carrying dead meat ?—They are.

5192. Are there any special arrangements made for the carriage of meat upon any of the great railways; for example, the Great Western Railway ?—The Great Western, the London and North-western, and the Great Northern are the principal lines that have arrangements.

5193. What are those arrangements ?—I believe they have a particular department for perishable articles ; but very frequently the meat is delayed in getting into the markets in consequence of insufficiency of space ; perhaps, for example, at the top of Skinner Street and adjoining St. Sepulchre's Church, there will be sometimes as many as eight or ten waggons waiting to deliver meat, and they will be too late for the market.

5194. You are aware that Smithfield will be in communication with all the railways shortly ?—Yes.

5195. Would not that obviate much of the inconvenience ?—It would obviate that inconvenience to a great extent, certainly.

5196. Are there not vans upon the Great Western Railway fitted up like a butcher's store ?—I have not seen any.

5197. (*To Dr. Whitmore.*) Can you answer that question ?—They have special vans in which the carcase is hung up precisely as if it were in a butcher's shop.

Mr. Way.—That applies only to the Great Western line, and, indeed, in that case I think it applies only to sheep that have come from Ireland, and are slaughtered at Bristol and sent up from thence.

5198. Leaving home cattle for a moment, and speaking of foreign cattle, you are aware that if the Plague were stayed at this moment there will always be the risk of introducing it into this country from abroad again ?—Yes.

5199. And it would become absolutely necessary to prevent foreign cattle being carried into the country, except under quarantine, or as dead meat ; would it be impossible to have markets for foreign stock established down at Thames Haven, where the foreign cattle could be sold and slaughtered, and the meat brought up from there ?—That could be done ; but it would be dividing the market, which we have always considered very prejudicial to the interests both of the public and of the retailer.

5200. But it would be a comparative amount of injury; we should have to consider the Plague on the one hand, and this inconvenenience on the other ?—Yes.

5201. Is there any other point which you wish to bring before the Commission ?—With regard to the cattle being slaughtered in the country, and sent up, supposing it was intended that the supply should

entirely come ready slaughtered to London, I may say that there is scarcely a country town or village where there is a slaughter-house capable of containing more than one or two bullocks. I have been in communication with many of the country people upon that subject, and in Northamptonshire and Leicestershire, and other parts of the country, their slaughter-houses will, perhaps, contain one or two small animals of say 80 stone, of eight pounds to a stone; therefore I think that at present such a system as has been spoken of could not be carried out without increased facilities.

5302. But under the pressure of necessity would it not be possible to get temporary sheds for such a purpose?—Yes; it is done, or was done, even in cow-yards. Biggs in the Edgware Road had a slaughter-house.

5203. (*Dr. Parkes.*) I understand you to say that at the present time half your meat comes up from the country?—Yes.

5204. As dead meat?—If you mean as regards my own purchases, more than half of it comes up in that way.

5205. Is that in the winter only, or in the summer also?—Winter and summer both.

5206. Is there as much sent up in the summer as in the winter?—No, not so much.

5207. Does that refer to cattle and sheep, or to cattle only?—To cattle and sheep.

5208. You individually, supposing you were obliged to do it, could increase that quantity of dead meat perhaps to such an extent as to supply all your trade in that manner?—I could do it, but at considerably increased expense.

5209. Why so?—I should require additional horses and carts, and manual labour also.

5210. To carry the meat?—Yes.

5211. What additional expense would that give you, do you suppose?—The expense of two horses and carts to begin with.

5212. It would apply to half your meat?—Yes.

5213. Would it increase the price per pound, do you think, sensibly?—It would increase my expenses by nearly 300*l.* a year; certainly by more than 200*l.*

5214. You would have to raise the price of meat, then?—I should have to charge it of course to the customer.

5215. How much would it increase the price per pound?—I cannot say as to the rate per pound.

5216. Would it be a very alarming increase?—No. Not an alarming increase, but an increase that would be very unwillingly borne, I presume.

5217. A halfpenny or one penny per pound?—I should say a halfpenny per pound at the least.

5218. Do you suppose that the same thing could be done by other butchers in a large trade like yourself?—Yes.

5219. Do they all, in the same way as yourself, get up a quantity of meat from the country now?—Yes; there are butchers in London doing about the same amount of business as myself who never kill anything.

5220. Do they get the whole of their meat from the country?—They get the whole of their meat from the dead meat markets.

5221. Which meat is killed in the country?—Yes; it is killed in Scotland, or wherever it may be.

5222. And sent up by railway?—Yes.

5223. Do I understand that the dead meat market is supplied entirely by country animals?—Yes; almost entirely, excepting as regards calves and cattle sold by the carcase butchers.

5234. You say that the trade is increasing very largely?—Very largely. I should say that within the last 20 years it has increased four fold.

5225. Can you give any idea as regards the general trade? How much of the meat is supplied from the dead meat market, in the way you have described, in London; is it one fourth or one third?—It is more than that.

5226. We already derive more than one third of our supply then from the animals killed in the country?—Yes.

5227. We also derive, I presume, a large amount of our supply from foreign animals killed in London?—Yes.

5228. What amount do we derive from English cattle sent up to London and killed there?—I should think 2,000 head a week is about the average.

5229. What per-centage would that be upon the gross supply?—Our cattle market averages I should say 5,500 head a week.

5230. Then out of 5,500 there are about 2,000 English?—Yes.

5231. They are killed in London?—Yes; in London and the suburbs; but there are times of the year when we have butchers from Birmingham and Manchester and other country towns buying in London, and taking them to those parts of the country.

5232. Is it not the case now, that the country butchers are offering to send meat up to London to private customers?—Yes; I have heard of it.

5233. Is it done to any extent?—No; only to a small extent.

5234. But the offers have been made, have they not?—Yes, such offers have been made.

5235. Would there be any difficulty in increasing the supply from that source?—I do not see any difficulty in it myself. The difficulty would be, I think, more with the consumer than with the butcher.

5236. So that a country butcher who does not supply London at all, living 30 or 40 miles from London, could increase very largely the supply in that way?—I do not think he could supply at a more reasonable rate than a London butcher.

5237. Still he might supply meat?—Yes.

5238. Supposing there was an imperative necessity of stopping the entrance of live cattle into London from English country places, and admitting only foreign cattle, to be killed in London immediately on their arrival, do you apprehend that it would lead to any real scarcity of meat in London?—No; if we might calculate upon a regular supply.

5239. At some increase in price?—Yes, at an increased price.

5240. But without any great increase in price?—The increase would not be great.

5241. And you would not be alarmed at such a rule?—No, not for a short period; and I think I might speak for the trade in that matter.

5242. You think that they would not view with alarm a regulation of that kind?—No. I have not been in communication with them; but I do not see any reason why they should, seeing that butchers who are now carrying on a large trade are supplied with their meat entirely from the dead meat markets.

5243. (*Mr. Ceely.*) What do you consider to be the characteristics of healthy meat in contra-distinction to those of the meat of animals that have died from the present disease?—It is apparent to a practised eye. It is distinguishable by the grain of the meat, and the juices that come from it also.

5244. I mean how can it be distinguished at a primâ facie view of it,—a simple inspection of it; would its colour have something to do with it?—Its colour would have a great deal to do with it, and its firmness also.

5245. But that firmness does not continue, I think? The firmness will be almost the same in warm weather as in cold weather in well-fed animals.

5246. In the case of an animal dying of this disease, do you expect to find the muscles become rigid very soon?—I should think not. I should think they would be rather flaccid.

5247. You would be rather surprised to find that that was the case?—Yes.

5248. You would look upon the rigidity of the

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muscles, what you call the stiffening of the muscles, as a test of healthy meat?—Yes.*

5249. Does that take place with animals which have suffered with this disease?—I have not seen this diseased meat, so as to be able to judge. I was pointing out the difference in the qualities of meat only this day to Dr. Whitmore. If you place on a slab a round of beef of a really well-fed animal such as I showed him (in that instance it was a Scotch beast), in the course of an hour or so you will find that from that piece of beef a large quantity of the juice of the meat, the gravy, will have exuded. You will not find that in either a second-rate or a third-rate beast.

5250. (*Dr. Parkes.*) Is that a red juice?—Yes; it is not blood, but really the juices of the meat.

5251. There really is more of that juice, I suppose, in good meat, than in an inferior quality?—You find scarcely any of it in the second-rate meat; in the third-rate or very inferior meat you find none at all.

5252. (*Mr. Ceely.*) It is a drier article?—Yes; a drier article.

5253. (*Chairman.*) Is there anything else that you would wish to state to the Commission?—No.

The witnesses withdrew.

Adjourned.

* The witness subsequently added the following remark:—
"The answers to these three questions" (5246, 5247, and 5248) "were given under the idea at the time that Mr. Ceely "referred to the flesh of the animal, and not to the muscles."

APPENDIX.

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APPENDIX A.

COMMUNICATIONS between HER MAJESTY'S GOVERNMENT and FOREIGN GOVERNMENTS respecting the Examination of Foreign Cattle at Ports of Exportation.

SIR, Foreign Office, August 11, 1865.

I ENCLOSE, for the information of the Lords of the Most Honourable Privy Council, a copy of an instruction which, in compliance with the request contained in your letter of the 5th instant, Lord Russell has addressed to Her Majesty's representatives at St. Petersburg, Stockholm, Copenhagen, Hanover, Hamburg, the Hague, and Brussels, requesting them to obtain from the Governments of their respective countries a careful inspection at their outports of all cattle shipped for any port of Great Britain, with a view to the prevention of the exportation into this country of infected cattle.

I am, Sir,
Your most obedient humble servant,
A. H. LAYARD.

The Clerk of the Council in Waiting.

Enclosure.

SIR Foreign Office, August 5, 1865.

[MY LORD,] I TRANSMIT to you herewith a copy of a letter which has been received from the Council Office, urging the expediency of arrangements being made by the Governments of those countries in the north of Europe in which the Cattle Plague exists to ensure a careful inspection at their outports of all cattle shipped for any port of Great Britain.

I have to instruct you, in accordance with the terms of this letter, to make a representation to the Russian [Swedish, Danish, Hanoverian, Hanse Towns, Netherlands, Belgian] Government, with a view to inducing them to adopt such measures as may be best fitted to prevent the export of diseased cattle from their country to Great Britain.

I am, &c.
(Signed) RUSSELL.

J. S. Lumley, Esq., St. Petersburgh.

[F. Hamilton, Esq., Stockholm.
Sir A. Paget, K.C.B., Copenhagen.
W. Doria, Esq., Hanover.
J. Ward, Esq., Hamburg.
Sir J. Milbanke, Bart., the Hague.
Lord Howard de Walden and Seaford, Brussels.]

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1. RUSSIA.

MY LORD, St. Petersburg, August 11, 1865.

ON the receipt of your Lordship's despatch, No. 24, of the 6th instant, I addressed a note to the Acting Assistant Minister for Foreign Affairs (together with a copy of the letter addressed to your Lordship by the Council Office of the same date), urging the Imperial Government to establish regulations for the strict inspection of cattle at the ports of export, with the view of preventing the spread of the Cattle Plague in England, by the adoption of which it is hoped the desired aim may be obtained, with the least inconvenience to the trade of the two countries.

I have, &c.
(Signed) J. SAVILE LUMLEY.

P.S.—I have since spoken to M. de Westmann on the subject, and his Excellency said, although a Cattle Plague certainly did exist in Russia, he did not believe that it could have been introduced into England from hence, as Russia did not export cattle to England, but, on the contrary, imported English cattle.

(Signed) J. S. L.

The Earl Russell, K.G.
&c. &c. &c.

MY LORD, St. Petersburg, August 27, 1865.

I RECEIVED a note to day from the Minister of the Interior, begging me to call on him, as he wished to speak to me on the subject of the measures he had caused to be taken in consequence of the suggestions I had made on the part of Her Majesty's Government for the prevention of the spread of the Cattle Plague.

I saw his Excellency this afternoon, and he informed me that, knowing how great was the interest taken by Her Majesty's Government on this question, he had without loss of time telegraphed to the authorities of the Maritime Governments of the Empire, requesting that not a single head of cattle should be allowed to leave the country without having passed a strict examination, and without a certificate of health from the veterinary surgeon appointed for that purpose; and he had requested the Minister of Finance to give the necessary orders at the different custom houses that this regulation should be strictly attended to. His jurisdiction, his Excellency said, did not extend to the Kingdom of Poland and the Grand Duchy of Finland; but he had communicated to the principal authorities of those Governments the steps he had taken, and he had no doubt they would adopt similar measures of precaution.

His Excellency informed me also that he had ordered statistical information to be drawn up, showing the number of animals of every description exported from Russia during the past and the present year, as well as tables showing the number of animals that had been attacked by the Rinderpest in each Government, and that as soon as these statistics were ready he would communicate them to me unofficially, and which he hoped would tend to allay the

alarm that existed with reference to the supposed exportation of diseased cattle from Russia to England.

From some of these tables, already in the possession of his Excellency, it appears that the Rinderpest has been most prevalent in the ports of Wilna and Kownow, the exportation from which (if any has taken place of cattle to England) would be through the Prussian ports of Memel, Tilsit, or Dantzig, and not through any Russian port.

M. de Walnieff again expressed his belief that on investigation it would be found either that the disease had arisen from local causes in England, or that, if imported, it must have been from ports nearer to England than those of the Baltic provinces.

M. de Walnieff said, however, that he thought it right to call my attention to the fact that this disease could be communicated by the introduction of the hides and hair of cattle that had died of the Rinderpest. He had given strict orders that the skins of all such animals should be burnt, and he did not think that any hides of diseased animals were now exported from Russia, but he thought it right this circumstance should be brought to the notice of Her Majesty's Government. I thanked M. Walnieff for the very obliging readiness with which he had met the wishes of Her Majesty's Government, and which I assured his Excellency would be highly appreciated by your Lordship.

I have, &c.

(Signed) J. Savile Lumley.

The Earl Russell, K.G.
&c. &c. &c.

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2. DENMARK.

Sir, Foreign Office, September 20, 1865.

I am directed by Earl Russell to request that you will acquaint the Lord President of the Council that the Danish Minister called this morning at the Foreign Office, and stated to me that the Cattle Disease had not made its appearance in Denmark, but that nevertheless the greatest attention would be paid to the cleanliness of vessels employed in the transport of cattle from Denmark to British ports.

I have the honour to be,
Sir,
Your most obedient
humble Servant,

The Clerk of the Council. E. Hammond.

My Lord, Copenhagen, September 16, 1865.

With reference to my despatch No. 90 of the 17th ultimo, on the subject of the exportation of cattle from Denmark to England, I have now the honour to enclose an extract from the Berlingske Tidende of the 15th instant, containing the circular which in consequence of my representations has been addressed by the Minister of the Interior to the chiefs of the police in the various districts, desiring them to take measures for preventing the exportation of any diseased cattle from Danish ports to England.

I have, &c.

Earl Russell, K.G. (Signed) A. Paget.

Enclosure 1.

Le ministère de l'intérieur vient d'adresser au Directeur de la police de Copenhague et à tous baillis la circulaire suivante :

Monsieur,

A l'occasion de la peste bovine qui sévit en ce moment en Angleterre, le cabinet anglais a exprimé au gouvernement danois le désir qu'un contrôle sévère soit exercé sur tout le bétail qui s'expédie de nos ports en Angleterre, afin d'empêcher que, par l'importation d'animaux malades, la contagion ne prenne dans ce pays un développement encore plus grand. Bien qu'il ait tout lieu d'espérer que les renseignements officiels transmis au gouvernement anglais sur l'état sanitaire de nos bêtes à cornes, le convaincront qu'il n'y a pas à craindre qu'aucune espèce d'épizootie soit importée par le bétail d'origine danoise, le ministère croit toutefois qu'il est de l'intérêt même des expéditeurs danois de satisfaire autant que possible au désir du gouvernement anglais, tant pour éviter qu'il ne s'élève des difficultés au lieu de débarquement, que parceque, à cause de la méfiance qui règne actuellement en Angleterre contre tout bétail de provenance étrangère, il importe plus que jamais que celui qui vient du Danemark y arrive dans un état parfaitement sain. Le ministère regarde par conséquent comme nécessaire que, jusqu'à nouvel ordre, il ne soit pas expédié de bestiaux en Angleterre sans qu'ils aient été examinés par un vétérinaire autorisé, dont le certificat, constatant leur bon état de santé, devra les accompagner, et il croit en outre devoir recommander aux expéditeurs de ne pas embarquer le bétail, avant de s'être bien assurés que les navires destinés à le recevoir ont été convenablement purifiés, que le fumier provenant des voyages précédents a été complètement enlevé, que la ventilation est suffisante, que le nombre d'animaux à expédier n'excède pas la place dont on peut disposer, et qu'on a pris les mesures nécessaires pour que, pendant la traversée, ils soient bien approvisionnés d'eau et de fourrage, et soignés par des gens spéciaux affectés à ce service.

Vous êtes invité à porter le contenu de cette circulaire à la connaissance de vos administrés, et, en particulier, des personnes qui s'occupent de l'expédition des bestiaux en Angleterre, ainsi que des capitaines des navires qui en effectuent le transport.

Enclosure 2.

Copenhague,

M. le Chevalier, Le 16 Septembre 1865.

Le Ministre de l'Interieur, que je me suis empressé d'informer de la teneur de votre note du 8 du mois passé relative au contrôle à exercer sur le bétail qu'on exporte de ports danois en Angleterre, vient de me communiquer que, depuis nombre d'années, les bêtes à corne en Danemark n'ont été attaquées d'aucune maladie contagieuse, à l'exception de la pleuro-pneumonie insudative, qui de temps en temps s'est spontanément manifestée ici. Bien que par cette raison il n'y ait pas lieu pour le Gouvernement de Sa Majesté Britannique de craindre que des maladies de la nature indiquée soient introduites en Angleterre par l'importation de bétail de provenance danoise, le Ministre de l'Interieur toutefois, afin de satisfaire autant que possible au désir exprimé dans votre susdite note, s'est décidé à adresser au Directeur de la Police de Copenhague et à tous les baillis de la province la circulaire ci-jointe sur les précautions à prendre pour que le bétail exporté des états du Roi en Angleterre y arrive dans un état parfaitement sain.

En vous priant de bien vouloir porter les dispositions de cette circulaire à la connaissance de votre Gouvernement je profite, &c.

Sir Augustus Paget. (Signed) Bluhme.

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3. HANOVER.

My Lord, Hanover, 28th December 1865.

With reference to Mr. Doria's Despatch, No. 37, of the 14th of October last, I have the honour to enclose a copy and translation of a note of the 21st inst., together with its enclosures in original, which I have received from Count Platen, transmitting (in answer to the note addressed to him by Mr. Doria in execution of the instructions contained in Earl Russell's Circular Despatch, No. 23, of the 9th of October last) duplicate copies of Hanoverian regulations relative to cattle diseases.

Your Lordship will perceive from Count Platen's note that none of these regulations at present apply to the Cattle Plague, but that the question of extending to it the law of the 23d of August 1855 concerning the Lung Disease in East Friesland (which forms the 1st enclosure in his note) is now under consideration.

Of this law I have the honour of enclosing herewith a translation by Mr. Cope.*

There is, I should observe, no evidence of the Cattle Plague (or Rinderpest, as it is called in German) having made its appearance in this country.

I have, &c.

The Earl of Clarendon. (Signed) Henry F. Howard.

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4. HAMBURG AND BREMEN.

My Lord, Hamburg, August 24, 1865.

I have the honour to transmit herewith to your Lordship the translation of a note which I have this day received from the senator, Dr. Rücker, in answer to my communication as to the precautions to be taken for insuring the examination of cattle shipped at Hamburg for British ports.

By this note it appears that no symptom of the Cattle Plague has been observed here or in the neighbourhood, but that, nevertheless, orders have been given by the Hamburg Government for the strict examination of all cattle shipped from this port to Great Britain.

I have, &c.

The Earl Russell, (Signed) W. Waddilove.
&c. &c.

Enclosure 1. (*Translation.*)

The note from Mr. Waddilove, Her Britannic Majesty's Consul acting for Her Majesty's Chargé d'Affaires, dated the 9th instant, by which Her Majesty's Government urges

* This law contains nothing relating specifically to exportation of cattle or to inspection at the ports.

the senate, with reference to the Cattle Plague, to adopt measures for insuring a strict examination of all cattle shipped for British ports, has been laid before the senate, and the Under Secretary is accordingly instructed to make the following communication in answer thereto:

According to the report recently drawn up by the medical authorities of this city, the state of health of the animals, and more especially of the cattle in the Hamburg territory, and, so far as can be ascertained, the cattle in Germany and Denmark, is uncommonly favourable; and at this present moment, excepting the usual occasional diseases, no epidemy or local disease (endémie) prevails. Thus, on the part of Hamburg, any precautions would appear to be unnecessary. In order, however, to comply with the wishes of Her Britannic Majesty's Government, the senate has made the arrangement that two authorized and sworn veterinary surgeons, viz., Georg Wilhelm Schrader and G. H. Warneck, shall be authorized to examine the cattle destined from hence for British ports before shipped, and to give certificates as to their state of health. The certificates in question will be made out in the annexed form, and will be attested by the police authorities of the suburb of St. Paul's.

The undersigned, in the hope that Her Britannic Majesty's Government will recognize in the above order a precaution taken against the export of diseased cattle, and receive it as a proof of the willingness of the senate to respond to the desires of Her Majesty's Government, gladly embraces this occasion, &c. &c.

(Signed) A. Rücker,
Dr.

Hamburg, August 23, 1865.

Enclosure 2. (*Translation.*)

Attestation.

At the request of Mr. in this city, I have this day examined cattle which are to be shipped by the , Captain , to , in respect of their state of health, and I accordingly truly certify that I have found the whole of the cattle thus to be shipped to be perfectly healthy.

N.N.,
Licensed Veterinary Surgeon,
Sworn for the examination of cattle to be shipped.

Hamburg, Suburb of St. Paul's,
1865.

These are to certify, that the above is the true signature of *N.N.*, Licensed Veterinary Surgeon, and sworn for the examination of cattle to be shipped to British ports, signed by himself.

Witness our hand and seal,
(L.S.) (*Signature*).

Hamburg, Suburb of St. Paul's,
1865.

My Lord, Hamburg, August 14, 1865.

With reference to my despatch of the 9th instant, No. 1, I have now the honour to report to your Lordship that in answer to the representations made by me, in accordance with your Lordship's instructions, to the Government of Bremen, I have received, under date of the 11th instant, a note from the senator at present at the head of the Committee of the Senate for Foreign Affairs, stating that no sign of the Cattle Plague has appeared in Bremen, but that Her Majesty's Government may rest assured that every possible means will be taken to prevent the export of diseased cattle from Bremen ports to Great Britain.

A translation of the note above mentioned is enclosed herewith.

I have the honour to be, with the highest respect,
My Lord,
Your Lordship's most obedient humble servant,
W. Waddidove,
Acting Consul-General.

The Right Hon. Earl Russell, K.G.,
&c. &c. &c.

Enclosure.

The note dated the 9th instant, which was addressed to this Government by Mr. Waddilove, Her Britannic Majesty's Consul at Hamburg, acting for Her Britannic Majesty's Chargé d'Affaires to the Hanse Towns, respecting the regulations to be made for preventing diseased cattle to be imported into Great Britain from Bremen ports, has, without delay, been brought to the knowledge of the senate; and the undersigned, acting in the absence of the President of the Committee of the Senate for Foreign Affairs, is accordingly instructed to answer the same, as follows:

Neither on the territory of the state of Bremen, nor in the neighbourhood, has any sign of the so-called Cattle Plague (*Rinderpest*) been observed. Her Britannic Majesty's Government may, however, rest assured, that the senate, convinced of the importance of this object for the well-being and health of the population of England, will keep the same seriously within its view; and in case any signs of the said disease should appear within the Bremen territory, or a well-founded fear of the export of diseased cattle from Bremen ports should arise, the port authorities will be instructed to watch with the greatest possible care over the export of cattle, and to prevent the export of diseased cattle.

The undersigned, &c., &c.

(Signed) J. H. Smidt.

Bremen, 11th August 1865.

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5. THE NETHERLANDS.

My Lord, The Hague, August 31, 1865.

I have the honour to forward herewith copy of a note signed, in the absence of the Minister, by the Secretary General of the Foreign Department, which contains the reply of the Netherlands Government to the representation addressed to it by me in obedience to the instructions contained in your despatch No. 42 of the 5th instant, with a view to inducing the adoption of measures for preventing the export of diseased cattle from this country to Great Britain.

I have, &c.

The Earl Russell, K.G., &c. &c. (Signed) J. R. Milbanke.

Enclosure.

La Haye, le 30 Août 1865.

Le soussigné, Ministre des Affaires Etrangères, a l'honneur de porter à la connaissance de Sir John Milbanke, Envoyé Extraordinaire et Ministre Plenipotentiaire de Sa Majesté Britannique, qu'a l'époque de la note que Sir J. Milbanke a bien vouler adresser au soussigné à la date du 7 de ce mois, il n'était pas connu au Ministère de l'Intérieur que l'epizootie régnant en Angleterre se fût étendue aux Pays-Bas.

Il résulte toutefois d'une communication du commissaire du Roi dans la Hollande méridionale qu'une maladie observée sur des bestiaux aux environs de Delft y a été propagée par du bétail revenu d'Angleterre, qui, par suite de la baisse de prix, n'avait pas été vendu au marché de Londres, et avait été ramené après un séjour de quelques jours dans cette capitale.

Un professeur de l'école vétérinaire a de suite été chargé d'observer la nature de la maladie, et les commissaires du Roi dans les provinces ont été invités a recommander aux autorités communales de faire appliquer avec sévérité les dispositions du Code pénal.

Cette mesure, si elle est rigoureusement observée, parait rendre inutile de defendre l'exportation de bétail pour l'Angleterre, defense qui du reste aurait peu de résultats, tandisque le but sera bien plus sûrement atteint au moyen d'une vigilance active contre l'importation de bestiaux malades.

Une commission de vétérinaires a été nommée pour inspecter le bétail et assister les autorités communales dans l'observation des dispositions pénales, ainsi que pour rechercher la nature de l'épizootie et faire un rapport tant à ce sujet que relativement aux mesures à prendre pour empêcher la propagation de la maladie.

Le soussigné saisit cettre occasion, etc.

Pour le Ministre,
Le Secretaire Général,
(Signed) A. Nijltenhooren.

Sir J. R. Milbanke.

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6. BELGIUM.

My Lord, Brussels, August 7, 1865.

On the receipt of your Lordship's despatch No. 36, of the 25th ult., in conformity to the instructions conveyed to me therein, I at once addressed a note to M. Rogier, and have to-day had a conversation with him on the subject of the inspection of cattle which it is desired to establish on exportation from Belgian ports.

M. Rogier was sensible of the importance of such measures. He said that the Government was prepared to take the matter into serious consideration; but that he was not sure how far the administrative sanitary control over local meat and cattle markets could be extended to the supervision of animals destined for exportation.

His Excellency, however, thought it very desirable that something should be done in the sense suggested by Her

Majesty's Government, and assured me that he would lose no time in letting me know what could be effected.

M. Rogier expressed a hope that measures of inspection on the exportation of cattle might become general throughout Europe.

I have, &c.
(Signed) HOWARD DE WALDEN.

The Earl Russell, K.G.,
&c. &c.

Enclosure.

M. LE MINISTRE, Brussels, August 5, 1865.

YOUR Excellency is no doubt aware that a destructive and highly infectious disease has made its appearance among the cattle in and about London. Its character is novel, and there appears reason to believe that it has been introduced by cattle imported from foreign countries.

Under these circumstances it becomes a duty for Her Majesty's Government to take into consideration measures which may tend to check the further development of this plague; and, obviously, one of the most urgent is to institute some control over the importation of cattle, with a view to ensure, so far as it may be possible, their sanitary condition before being allowed to be landed. Stringent resolutions of this nature, if enforced only at the port of disembarkation, must tend to cripple the trade with foreign countries.

Under these circumstances, I have received instructions to submit to your Excellency the prudence as well as policy, in the interest of the two countries, of adopting in Belgian ports such measures of inspection, and possibly of detention, of cattle, as the case may be, as may give confidence to the public in general, by a well-grounded assurance that every effort is being made to prevent the export of diseased cattle.

The adoption of such a course might be sufficient to induce Her Majesty's Government to forego having recourse to extreme measures of restriction which may otherwise be deemed necessary, to prevent the introduction and spreading of the disease, but which could not fail in their operation to prove exceedingly injurious to the foreign cattle trade.

I avail, &c.
(Signed) HOWARD DE WALDEN.

M. M. C. Rogier.

APPENDIX B.

CORRESPONDENCE on INSPECTION, &c. of IMPORTED CATTLE and on CONVEYANCE of CATTLE by SEA.

I.—CORRESPONDENCE WITH THE BOARD OF CUSTOMS.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.,
SIR, 27th November 1865.

THE Cattle Plague Commissioners would be glad to obtain more particular information than they at present possess on some points connected with the importation of cattle into the United Kingdom.

1. They would be glad to be furnished with a copy of the Instructions under which the veterinary inspectors appointed by the Board of Customs act in the performance of their duties, and to know whether any and what periodical reports are sent in by these inspectors to the Board.

2. They wish to know whether at the principal ports of importation adequate facilities exist, or could be provided, for slaughtering or detaining, during a period of quarantine, diseased or suspected animals. Fat stock are of course injured in value by being either detained or slaughtered in unsuitable places. Would there be any difficulty, in the opinion of the Board of Customs, in confining the importation of cattle to ports where such facilities exist, or could be provided, at or in the immediate vicinity of the wharves or landing places?

3. Veterinary surgeons have, as the Cattle Plague Commissioners are aware, been appointed inspectors at almost all of the ports of the United Kingdom. In the opinion of the Board of Customs, has sufficient provision been made for securing prompt and thoroughly competent inspection at all the ports, and can reliance be placed on such provision being made in future? If not, would there be difficulty in confining the importation of cattle to places where such provision could always be made?

4. Are there, at all the ports, places where animals arriving after nightfall, or when the inspector is not on the spot, can be kept without injury, and is provision made for their being fed and watered while so detained?

5. The Commissioners further desire to learn whether any regulations have been made by authority to secure the thorough cleansing and disinfecting, after every voyage, of vessels employed in the cattle trade, to prevent the animals from being overcrowded, and to ensure their being fed and watered at proper intervals; if not, they would be glad to know whether any such regulations could, in the opinion of the Board, advantageously be made, and by what authority.

The Commissioners will be happy to receive such information on the points above specified as it may be in the power of the Board of Customs to afford, in any manner which the Board may judge most convenient. Should they, after receiving answers in writing, desire further oral information, they will ask the favour of your attendance here or for that of some officer of your Board.

I am, &c.
Right Hon. MOUNTAGUE BERNARD.
Sir Thos. Fremantle, Bart., &c.,
Chairman of the Board of Customs.

Custom House, E. C.
SIR, 6th December 1865.

THE Chairman having laid before the Board your letter dated the 27th ultimo, signifying the desire of the Cattle Plague Commissioners to obtain more particular information than they at present possess on some points connected with the importation of cattle into the United Kingdom;

I am desired by the Board to furnish for the information of the Cattle Plague Commissioners the following explanation on the several points referred to in your letter, viz.—

First.—The request of the Commissioners to be furnished with a copy of the instructions under which the veterinary inspectors appointed by this Board act in the performance of their duties, and whether any and what periodical reports are sent in by these inspectors to the Board.

I beg to state that the Board act in this matter under directions from Her Majesty's Privy Council, and they transmit for the guidance of their officers and the veterinary surgeons employed at the outports, copies of such orders as the Board receive from the Lords of the Council; but that no special instructions have been issued by the Board to veterinary surgeons, inasmuch as these gentlemen, as members of the College of Veterinary Surgeons, are presumed to be competent to decide as to the proper mode of examination and inspection, and the Board have not interfered with the discharge of the professional duties of the inspectors by giving them special instructions or regulations.

Periodical reports are not made to the Board by the veterinary surgeons.

Secondly. — Whether at the principal ports of importation adequate facilities exist, or could be provided, for slaughtering or detaining, during a period of quarantine, diseased or suspected animals:

Whether there would be any difficulty, in the opinion of the Board of Customs, in confining the importation of cattle to ports where such facilities exist or could be provided.

The Board are not in possession of sufficient information to enable them to reply definitely to this inquiry, but they are not aware of any instance in which it has been found impracticable to detain cattle which the inspectors at an outport deemed it necessary to keep for further examination. And

So far as the Board of Customs are concerned, there would be no difficulty

in confining the importation to certain selected ports, and it would lessen the responsibilities of their officers; but such a regulation must be made by an Order in Council, and might give rise to complaints from persons engaged in the cattle trade at ports deprived of the privilege.

Thirdly.—Veterinary surgeons have, as the Commissioners are aware, been appointed inspectors at almost all the ports of the United Kingdom. In the opinion of the Board of Customs has sufficient provision been made for securing prompt and thoroughly competent inspection at all the ports, and can reliance be placed on such provision being made in future?

If not, would there be difficulty in confining the importation of cattle to places where such provision could always be made?

At the principal outports the inspectors hold diplomas from the College of Veterinary Surgeons, and the Board have no reason therefore to doubt their professional ability to make a competent examination and inspection; nor have the Board any reason to think that at the smaller ports every practicable care will not be taken to carry out the Orders of the Lords of the Privy Council; but at some of these ports it has been found impossible to secure the aid of inspectors with the same professional knowledge as at the larger outports and in London.

In December 1863, in consequence of an irregularity in the passing of some cattle at an outport, a repetition of which the Board at once took measures to prevent, the Board contemplated issuing some more detailed general regulations in regard to the examination of cattle and sheep, including, amongst other regulations, the providing at each landing-place sufficient space for examination, so that if more than one cargo arrived at a time each cargo might be kept distinct and separate.

These regulations were to have applied to London as well as the outports; but much opposition was made to their adoption by some of the London wharfingers, who appealed to the Board of Trade against the proposed regulations, and it was deemed inadvisable to proceed further in the matter, more particularly as at that time Bills were before Parliament for enacting further legal provisions regulating the importation of cattle, and the whole question was under the consideration of the Government.

There would not be any difficulty, so far as the Customs Department is concerned, in confining the importation of cattle to places where every requisite ordered by Her Majesty's Privy Council shall have been provided.

Fourthly.—Are there, at all the ports, places where animals arriving after nightfall, or when the inspector is not on the spot, can be kept without injury; and is provision made for their being fed and watered while so detained?

The Board have not sufficient information to enable them to reply fully to this inquiry.

As regards the enforcement by the officers of Customs that cattle be watered and fed, it would, as the Board apprehend, require either legal enactment or an Order in Council to enforce such a regulation; and as the importers are pecuniarily interested in the lives of the beasts they have imported, it is a question whether it might not be safely left to the parties most interested.

The Board, in consequence of a letter from the Privy Council, dated the 8th September last, called on the proprietors of wharves in London at which cattle are landed to provide water, and urged on them to make arrangements to provide food.

As the premises in London where the principal portion of the cattle are landed are sufferance wharves, to which the privilege of landing can only be granted under special orders of the Board, the Board had the power to withdraw the privilege, if the conditions which they thought fit to impose as to feeding and watering cattle were not complied with. But at the outports, where legal quays have been set out under the Customs laws for the landing of goods from foreign [ports], including cattle, if the cattle are landed at the legal quay the Board have no power to impose conditions on the importers of cattle, in the absence of an Order of Her Majesty in Council or other legal enactment.

Fifthly.—The Commissioners further desire to learn whether any regulations have been made by authority to secure the cleansing or disinfecting after every voyage of vessels employed in the cattle trade, to prevent the animals from being overcrowded, and to insure their being fed and watered at proper intervals. If not, whether any such regulations could, in the opinion of the Board, advantageously be made, and by what authority.

No regulations on this point have been made.

On the 7th August last the Lords of the Privy Council requested to be furnished with a description of the measures which the Board considered necessary for cleansing, &c. vessels in which cattle are brought to this country; and the Board submitted, in reply, Regulations, copies of which are annexed.

No Orders have, however, been issued by the Council on this subject, nor in respect to the number of cattle to be carried, nor to enforce their being supplied with water or food whilst on board ship.

I am, Sir,
Your most obedient servant,
GEO. DICKINS,
Secretary.

Mountague Bernard, Esq.
&c. &c. &c.

Proposed Regulations for the better Prevention of Disease in Imported Cattle.

No vessel in which cattle have been imported shall clear outwards until every part of such vessel in which cattle have been placed shall be thoroughly cleansed with water, and subsequently by the application of disinfectants to the satisfaction of a sanitary officer to be appointed by the Privy Council.

Cattle brought in any vessel in which either the accommodation or the ventilation is pronounced by such sanitary officer to be imperfect will be liable to detention, at the risk and expense of the importers, until the state of the cattle is such as to enable the veterinary surgeons to make a satisfactory examination.

All wharves or places on which cattle may be landed, as well as the stages or other means used in landing them, shall in every case be cleansed, and disinfectants applied, before they are again used.

Memorandum explanatory of the grounds on which the Regulations are recommended.

The officers of Customs having charge of vessels do not possess the knowledge requisite for ascertaining that the sanitary regulations proposed have been effectually carried out, and therefore it is indispensable to their success that a medical officer should be appointed to inspect the vessels on arrival, and again after cleansing; and that only upon his certificate should the vessels be allowed to leave the port.

Considerable opposition may be expected to these Regulations, because they will cause delay in the departure of the vessels, or necessitate the employment of extra vessels.

It would therefore be very desirable, in order to facilitate the adoption of any Regulations which the Lords of the Council may see fit to direct, that such directions should be communicated by their Lordships to the proprietors and owners of shipping employed in this trade.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.

SIR, 13th December 1865.

WITH reference to the subject of my letter to Sir Thomas Fremantle of the 27th ultimo, I am to request that the Commissioners of Customs will be pleased to furnish me, for the information of this Commission, with copies of the following papers:

(1.) No. $\frac{113}{1856}$ (Instructions in respect to the delivery of cattle) with a paper marked A. and an annexed form.

(2.) No. $\frac{36}{1857}$

I am, Sir,
Your obedient Servant,
MOUNTAGUE BERNARD.

F. G. Gardner, Esq.,
&c. &c.
Custom House, E.C.

Custom House,
15th December 1865.

SIR,

I AM directed by the Commissioners of Her Majesty's Customs to transmit, in compliance with the request contained in your letter of the 13th instant, the enclosed

copies of two General Orders issued by the Board to their officers on the subject of the Cattle Plague; viz.:

No. $\frac{113}{1856}$ with its inclosures.

No. $\frac{36}{1857}$

I am, Sir,
Your most obedient Servant,
GEO. DICKINS,
Assistant Secretary.

Mountague Bernard, Esq.,
&c. &c.

Enclosure 1. in preceding letter.

No. $\frac{113}{1856}$

By the Commissioners for managing and causing to be levied and collected Her Majesty's Customs.

6th September 1856.

The Board having, with reference to the General Order, No. $\frac{74}{1856}$, transmitting copy of an Order in Council, dated the 28th July last, making further provision respecting the importation of diseased cattle, sheep, &c., approved of instructions for the guidance of the officers, on the arrival of foreign cattle in this country;

Ordered, that copies thereof be delivered to the proper officers in London, and transmitted to the collectors and comptrollers at the several out-ports for their government.

Custom House, London,
24th December 1856.

THE aforegoing copy of the Board's Minute of the 6th September last, is, together with a copy of the instructions therein referred to, transmitted to the collector and comptroller at

By order of the Commissioners,
F. G. GARDNER.

Instructions in respect to the Delivery of Cattle.

The Commissioners of Customs deem it necessary, for the guidance of their officers in all cases to which their General Order $\frac{74}{1856}$ applies, but with special reference to a contagious disease, called "Murrain," which has recently broken out amongst the horned cattle at Mecklenburg, to issue the following general instructions, together with the accompanying statement of the symptoms of the particular disease in question.*

1st. On the arrival of a vessel with cattle, sheep, lambs, or pigs, the attendance of the veterinary surgeon is to be obtained as soon as possible.

2nd. After the cattle, sheep, lambs, or pigs have been landed, they are to be kept in charge until each animal has undergone a careful examination, and if found free from disease the whole are to be passed immediately; but in the event of any disease being found to exist, such of them as may be so diseased are to be immediately killed, if the same be considered necessary by the veterinary surgeon; and if upon a post-mortem examination of such cattle, sheep, lambs, or pigs, the same be found fit for human consumption, they, and the rest of the importation, are to be delivered to the owner or owners thereof; but should any of those so examined be unfit for such purpose, and the disease be of an epidemic or contagious character, they are to be buried, or effectually destroyed, in the presence of an officer, and the remainder of the importation detained for further examination so long as the veterinary surgeon may deem necessary, and dealt with as before directed. The expenses incurred in detaining the whole or any part of the importation, or in killing and destroying those unfit for human food, to be defrayed by the owner or owners.

3rd. Sheep and lambs are not to be examined after dark, daylight being absolutely necessary for the detection of certain diseases.

Lastly. The veterinary surgeon is to be required to keep a record of the particulars of each transaction agreeably to the annexed form.

Port of

Name of vessel.	From whence.	No. of cattle landed.	Date and hour landed.	Date and hour of examination.	Date and hour passed out of charge.	No. of cattle detained.	Date and hour when		Sex of beast slaughtered.	Nature and extent of disease in each beast slaughtered.	How disposed of when slaughtered.	Name of examining surgeon.
							Detained.	Released.				

Enclosure 2.

No. $\frac{36}{1857}$

Office of Committee of Privy Council for Trade,
Whitehall, 3rd April 1857.

SIR,

IN connexion with the examination of cattle offered for permission to be landed at the various ports of the United Kingdom, I am directed by the Lords of the Committee of Privy Council for Trade to acquaint you for the information of the Commissioners of Her Majesty's Customs, that it has been indirectly communicated to their Lordships that in the event of any cattle shipped for this country, dying or manifesting symptoms of disease on the passage, it has been a practice of the officer in charge of the vessel to cause them to be thrown overboard, thus destroying the evidence on which the remainder of the cargo might be subjected to precautionary detention.

My Lords would suggest that, with a view to counteracting this device, the officers at the several ports should be instructed to compare the number of cattle proposed to be landed with that which appears in the ship's manifest and other papers, and that the inability to account for those deficient should subject the rest to all the measures incident to well-grounded suspicion.

My Lords would further call the attention of the Commissioners, that in the cases of intestinal disorders, accompanied by infection, the danger of contagion is believed to attach to the droppings and manure of the animals affected, and consequently that vigilant attention should be paid to the condition of the decks, in any vessel from which suspected cattle have been landed, and that their thorough purgation, so far as the Commissioners of Customs have any power to require it, should be strongly impressed on the persons in charge of such ships.

I am, Sir,
Your obedient Servant,
J. EMERSON TENNENT.

The Secretary of
Customs.

Custom House, London,
8th April, 1857.

THE aforegoing copy of a letter from Sir James Emerson Tennent, Joint Secretary to the Lords of the Committee of Privy Council for Trade, is transmitted to the collector and comptroller at
for their information and guidance.

By order of the Commissioners,
F. G. GARDNER.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10)
Westminster, S.W.
15th December 1865

SIR,

ON the part of this Commission I have to acknowledge, with thanks, the receipt of your letter of this date with its enclosures.

* This statement is omitted as superfluous.

I have further to request that the Commissioners of Customs will have the goodness to state, for the information of this Commission:

1. Whether the two General Orders specified in your letter are now in force?
2. Whether the Veterinary Inspectors keep such tabular records as are directed by the order No. $\frac{113}{1856}$; and, if so, whether such records are transmitted by them to the Board of Customs, or what becomes of them?
3. Whether, if the number of cattle proposed to be landed from any ship does not agree with the number in the ship's manifest, and no account of the deficiency is given, any special measures are adopted, or have been ordered, as "incident to well-grounded suspicion"?

The Commissioners of Customs will doubtless see sufficient reason for these inquiries in the great importance which this subject has assumed, and which it appears likely to possess hereafter.

I am, Sir,
Your obedient Servant,
MOUNTAGUE BERNARD.

Geo. Dickins, Esq.,
Assistant Secretary,
Board of Customs.

Custom House,
Sir, 17th January 1866.

Having laid before the Commissioners of Her Majesty's Customs your letter of the 15th ultimo, requesting to be furnished with certain information on behalf of the Cattle Plague Commissioners,—

I am directed to acquaint you, in reply to your first inquiry relative to the General Orders of this Board No. $\frac{113}{1856}$ and No. $\frac{36}{1857}$, that both of these Orders are still in force.

In reply to the second inquiry, as to the tabular records being kept by veterinary surgeons employed by this department, I am desired to state that, from the inquiries made by the Board, it appears that the veterinary surgeons have kept the records directed by General Order No. $\frac{113}{1856}$, except at one port, where the Board have now directed it to be kept; but that such records are not transmitted to the Board, but are retained at the respective ports.

And as to the third inquiry, relative to the special measures adopted when the number of cattle landed from any ship does not agree with the number on the ship's manifest, I am desired by the Board to acquaint you, that having made inquiry what steps are taken by the officers at the outports in order to give effect to the suggestion of the Lords of the Committee of Privy Council for Trade in their letter dated the 3rd of April 1857, the Board are informed that in all cases wherein a difference has been found between the number of cattle reported and that landed from any vessel, a satisfactory explanation has been required from the master before the report has been allowed to be amended; but the Board are informed that instances of discrepancies of this kind have been infrequent. The Board have, however, again called the special attention of their officers to the suggestions contained in Sir J. Emerson Tennent's letter of the 3rd April 1857, in a further General Order, dated the 15th instant $\left(\frac{2}{1866}\right)$, a copy of which I am directed to forward herewith, for the information of the Cattle Plague Commissioners.

I am, sir,
Your most obedient servant,
GEO. DICKINS,
Assistant Secretary.

Mountague Bernard, Esq.
&c. &c.

Enclosure in preceding Letter.

No. $\frac{2}{1866}$.

Minute of the Board of Customs, dated 10th January 1866.

The Board deem it necessary to call the special attention of their officers to the letter of Sir J. Emerson Tennent, dated 3rd April 1857, transmitted in General Order, No. $\frac{36}{1857}$, by which "the officers at the several outports "are instructed to compare the number of cattle landed "with that which appears in the ship's manifest and other "papers, and that the inability to account for those defi- "cient should subject the rest to all the measures incident "to well-grounded suspicion;" and, as it would appear from the inquiries which the Board have made, that although, in all cases where a deficiency has been found between the number of cattle reported and that landed from the vessel, the master has been called upon for satisfactory explanation as to the cause of the difference, yet, in consequence of cattle being frequently allowed to be landed and delivered before the officers who examine the cattle have received the master's report, the officers and veterinary surgeon have not the means of giving full effect to the suggestions contained in Sir J. Emerson Tennent's letter herein before referred to, the Board desire that the following regulations be observed in all cases in which importers are desirous of landing cattle before the master's report has been received by the examining officer, viz.:—

That the masters of all vessels bringing cattle be required to produce to the officers of this department, immediately on arrival, a cattle manifest (agreeably to the form annexed to this minute), in addition to the ship's usual report, such manifest to contain full particulars as to the number and denomination of the cargo, a note being made thereon of the number and description of any cattle that may have died on board, or that have been thrown overboard; the cause of death, whether from disease or otherwise, being also stated.

The Board also direct that their sanction be obtained for the amendment of ships' reports in all cases of deficiencies in the number of cattle landed; and in the event of the officers having reason to believe that the cleansing of the decks of cattle ships, as recommended in the Council Order of the 3rd April 1857, has in any case been omitted, the circumstance is to be reported for the Board's information and directions.

And copies of this minute, with copies of the form of manifest therein referred to, are to be delivered to the proper officers in London, and transmitted to the collectors at the outports, for their government.

Custom House, London,
15th January 1866.

The aforegoing copy of the Board's minute of the 10th instant is, with copy of the form of manifest therein referred to, transmitted to the collector at
for his government.

By order of the Commissioners,
J. B. Hale.

II. CORRESPONDENCE WITH OWNERS OF STEAM SHIPS EMPLOYED IN THE CATTLE TRADE.

[A similar letter to the following was addressed to each of the shipping owners whose names are given below.]

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.

GENTLEMEN, 1st December, 1865.

I SEND you herewith a copy of a letter,* which on the part of this Commission I have addressed to the Chairman of the Board of Customs.

You will oblige the Commissioners by furnishing them with any information which, as owners of vessels employed in the cattle trade, you may be able to afford, with reference especially to the subject of Question 4 (local facilities for inspection and for the temporary detention of cattle), and of Question 5 (the transport of cattle by sea).

The Commissioners will thank you for particular information as to the precautions which you adopt for securing proper accommodation for cattle on board your ships, and for the prevention of disease, and as to the degree of success which is attained by such precautions.

I am, Gentlemen,
Your obedient Servant
MOUNTAGUE BERNARD.

Messrs. Phillipps, Graves, Phillipps & Co.,
St. Dunstan's Hill, E.C.
Mr. George Russell,
1 & 2 Fenchurch Street, E.C.
The Great Eastern Railway Company,
Bishopsgate, E.C.
Mr. A. G. Robinson,
St. Petersburg Steam Ship Office,
20 Mark Lane, E.C.
The General Steam Navigation Company,
21 Lombard Street, E.C.

St. Dunstan's House, London, E.C.
SIR, 8th December, 1865.

IN reply to your letter of the 1st inst., requesting us to furnish you with some particulars respecting the Foreign

* See Correspondence with Board of Customs, letter of the 27th November, p. 40.

Cattle Trade, and enclosing copy of a letter to the Chairman of the Board of Customs, we beg leave to observe with regard to Question No. 4, that our experience of this trade is confined to this port, and that at none of the wharves here do we consider the accommodation sufficient for the feeding and watering of cattle detained after nightfall for inspection by the doctor; at some of them the public street is the only available place for the cattle. For the last two years cattle arriving by our steamers have been landed at Thames Haven, (near the mouth of the Thames, in Essex) where facilities exist for turning the beasts into fields adjoining the wharf, in case of need, and also for watering and feeding, while waiting for inspection. From this place cattle are conveyed by rail to the Cattle Market or adjacent lairs, as may be required, in about two hours, thus avoiding all driving through the streets.

As regards Question No. 5, the cleansing of vessels is carefully attended to after the discharge of the cattle, but we are not aware of any regulations existing by authority on this point. Supervision of this is no doubt exercised at the loading ports abroad, where it is most necessary. Every possible accommodation is afforded on board our steamers, the space being calculated according to the season and the size of the beasts, and wooden fences being fixed at certain distances to prevent them crowding too much in one part, or being thrown together in bad weather, while ventilators are freely introduced below from the decks. Men are specially appointed to feed and water them during the voyage, and to keep them clean and in their places. As regards the success of the efforts made to conduct this traffic properly, we believe the cattle importers will testify that it is attained to such a degree that the dangers of the voyage are reduced to the minimum point.

In respect of the other points raised, we beg to remark that at all the foreign ports with which we trade, viz., Rotterdam, Bremen, Gothenburg, Malmö, Aalborg, Aarhuus and Copenhagen, every means are taken, by the appointment of properly qualified doctors, in each instance (we believe) under the direction of the respective Governments, to prevent the shipment of diseased cattle, and with each cargo is sent a properly certified bill of health. The result of this has been that instances of disease on arrival here have been with us very rare indeed. In one instance, a cargo of sheep and oxen from Sweden were detained at Thames Haven (in the fields) under suspicion of disease for some days, but were ultimately released as sound. This shows clearly the necessity of having proper accommodation at the landing places for such purposes, and such accommodation is probably to be obtained only at some distance from London.

We have the honour to remain, Sir,
Your most obedient Servants,
PHILLIPPS, GRAVES, PHILLIPPS & Co.

The Secretary of the Cattle Plague Commission,
House of Commons, Room No. 10,
S.W.

London, 1 & 2 Fenchurch Street,
SIR, 9th December 1865.

I AM duly in receipt of your communication of the 1st instant, with the accompanying copy of letter addressed by you to the Chairman of the Board of Customs, and have now the pleasure of submitting the following remarks for consideration of the Royal Commission.

As to Question No. 4.

At the ports to which steamers under my management deliver cattle, viz., London,* Lowestoft, and Southampton, there is very excellent provision for cattle being housed, fed, and watered, so as they can be kept without injury till such time as they are inspected and passed by the Veterinary Inspector.

As to Question No. 5.

No compulsory regulations are in force as to cleansing and disinfecting cattle vessels after the delivery of each cargo, neither are there any regulations preventing overcrowding, but all that can be done is voluntarily and most carefully done by myself and other owners to ensure thorough efficiency in the careful, healthful, and humane mode of conveyance; cattle being fed and watered on the voyage, and barriers being securely placed so that the cattle stand in pens of 3 to 10 each, thus effectually preventing overcrowding; perfect ventilation is secured, and after each successive voyage the vessels are cleared of all manure, &c., purified, and then disinfected by a free and careful application of chloride of lime.

The precaution is always taken, at ports where my boats trade to regularly, to have cattle inspected on shipment and a certificate of health sent with each cargo—*any cattle presented for shipment in an unsound condition being rejected*—and cattle attendants, four to each vessel, specially appointed to feed, water, and tend them.

The result of which precautions is, that cattle imported from Tonning (the principal port with which my trade is connected) are invariably sound and in excellent condition; during the course of the last seven years no single case of disease having been brought to my knowledge, and no cattle ordered to be slaughtered except from injuries received on board in stormy weather.

I may add that my remarks apply to paddle steamers specially built for cattle carrying, and thoroughly ventilated, such as the "Tonning" and "City of Norwich," employed in bringing cattle from Tonning to Blackwall, which I particularly mention, as they have both been examined by Dr. Thudichum, of the Medical Department of the Privy Council.

In my opinion, slaughtering or quarantine at the place of landing of cattle would be almost equivalent to stopping importation.

Any further information I shall be glad to afford either personally or by letter.

I am, Sir,
Your obedient servant,
To the Secretary, GEO. RUSSELL.
Cattle Plague Commission,
Westminster.

* At Brunswick Pier, Blackwall.

The Great Eastern Railway Company,
Secretary's Office, Bishopsgate Station,
London, N.E.

SIR, 14th December 1865.

IN reply to your letter of the 1st instant, requesting me to furnish your Commissioners with any information which the directors of my company, as owners of vessels employed in the cattle trade, may be able to afford, with reference especially to the subject of Question 5 (the import of cattle by sea), and of Question 4 (local facilities for inspection, and the temporary detention of cattle) as contained in a printed letter from you to the Board of Customs; also for particular information as to the precautions which my directors adopt for securing proper accommodation for cattle on board their ships, and for the prevention of disease, and as to the degree of success which is obtained by such precautions;

I beg to enclose copy of Regulations drawn up by Mr. Wood, the Collector of Her Majesty's Customs at Harwich, sometime ago for our guidance, which Regulations have been duly carried out; also a copy of some Regulations which were also drawn up and issued by that gentleman for the guidance of his own officers, now kindly furnished at my request; which taken together will, I hope, fully afford the desired information. I can only add, that there have been but two cases of Cattle Plague imported here, when the animals affected (which were in the earliest stage of the disease) were immediately slaughtered and buried.

As the port of Harwich is now (next to London) the first port in the kingdom for the importation of foreign cattle, my directors are exceedingly anxious that all their arrangements should be as complete as possible, and they will gladly receive and carry out any suggestions which may be made to them to that end.

I am, Sir,
To the Secretary of the Your obedient servant,
Cattle Plague Commissioners, J. B. OWEN,
House of Commons, S.W. Secretary.

Enclosure 1. in preceding letter.

Accommodation for Foreign Cattle at Harwich, and Regulations observed on their Importation.

Accommodation.

The vessels are constructed and fitted specially for the conveyance of cattle as well as other cargo.

There are dry, well-drained, and ventilated lairs, supplied with water, and the cattle pens, besides being well-drained and spacious, are supplied with water troughs.

There are sheds on the Company's premises for the temporary housing of suspected cattle, approachable without passing over any public road or thoroughfare.

There is a convenient and well-drained slaughter-house at hand, but clear of the other premises, and a burial ground for condemned cattle or meat on railway ground seven miles distant, where the Company have also agreed to deposit and retain all the manure from the ships and lairs.

Regulations observed on arrival of a Cargo.

There is a Cattle Inspector attached to the Customs' staff, who is a member of the College of Veterinary Surgeons, and attends the arrival of every cargo.

Should a cargo arrive before evening, the animals are examined and passed at once, when they are either taken to the lairs and provided with hay and water, or to the pens (which are also provided with water) preparatory to being trucked and sent away.

If arriving too late for a careful examination, before dark, they are housed in the lairs till the following morning, provided with hay and water as before stated, and after being examined by the Veterinary Surgeon at daylight and passed, are trucked and sent to their destination.

Animals bruised or seriously hurt, are at once slaughtered in the Company's slaughter-house, and together with any found dead, are, after inspection by the Veterinary Surgeon, if certified as fit for human food, delivered; if otherwise, both carcases and hides are destroyed by being saturated with carbolic acid in the presence of a Customs' Officer, and, if decomposed, sent in charge of such officer to the burial ground before mentioned and interred six feet deep, as would be the case with any showing symptoms of a contagious or infectious disorder, but none such have as yet arrived.

Should any live cattle arrive with suspicious symptoms, but not sufficiently defined as to warrant the use of the knife, they would be removed to the building set apart for such a contingency, and subsequently be delivered, or slaughtered and buried, as the event might justify; but should a single animal affected with the plague arrive, it would be destroyed and buried, and all those imported in the same ship be detained and kept apart for so ong a period as the Customs' authorities might deem necessary or expedient.

On discharge of a cargo the steamers, from the deck to the lower hold, are scraped, flushed by means of a steam-hose, and lime-washed, when they are inspected by a Customs' officer on being officially cleared for another voyage.

The trucks conveying cattle arriving from the Continent are kept separate from all others, and cleansed and lime-washed after every journey.

The lairs are regularly lime-washed, and the litter removed, when they are thoroughly cleansed, and fresh litter laid down.

Finally, the whole are supervised by the Officers the Customs, and their Cattle Inspector.

J. W. Wood,
Collector.

(Agreed) J. G. Powers,
Continental Traffic Manager.*

Custom House, Harwich,
August 26, 1865.

Enclosure 2.

Port of Harwich.

Regulations to be observed by Mr. Stevenson, Examining Officer, respecting Foreign Cattle, from their importation to their delivery, during the prevalence of the Cattle Plague.

1. On arrival of a cargo, that the animals be duly tallied out, and it be seen that they are taken to the place assigned for their examination by the Veterinary Inspector, also that none be permitted to be sent away until such officer has examined them, and certified that they are free from disease.

2. A report to be made to the Collector every morning respecting the condition of the animals arriving, and the number and description of such as may have died or been slaughtered during the voyage (if any), when special instructions will be issued as to their disposal, with reference to the provisions of the Order in Council of the 17th November 1863, of which the examining officer has a copy.

3. That in the event of the veterinary inspector discovering a case of Cattle Plague or any other contagious or infectious disorder, with reference to the Order in Council of July 1856, and the Board's orders thereupon, which the examining officer has read from time to time as they have been received, the fact be immediately reported to the collector, who will issue such directions as he may consider necessary, till the pleasure of the Board can be ascertained.

4. That all animals condemned by the Veterinary Inspector as unfit for human food, must (unless decomposed) be opened by the railway servants, and liberally watered by its officers by means of a watering-pot having a rose top to to the spout, with diluted carbolic acid in the proportion of a pint of the acid to a gallon of water, when, unless required by the agent for the owner, the carcases may be buried in an approved place or taken out to sea, as follows: (a portion of one of the ears of each being first cut off) either by the steamer which brought them in, or by the company's tug boat, but in all such cases must be thrown overboard at ebb tide, and no nearer the land than the seaward side of the Cork Light Ship; but in cases of Cattle Plague, the carcases must first be opened and freely watered with diluted carbolic acid as before-mentioned, then buried in an approved place, and before being earthed up two bushels of unslacked lime (provided by the company) be thrown over each carcase.

5. That a strict watch be kept over any animals that may be detained, and that none be allowed to be removed without the knowledge and authority of the veterinary inspector and the collector; also, that the place where animals may have been detained be thoroughly cleansed and disinfected by the company, as may be approved by the veterinary inspector, previous to any fresh animals being taken there.

6. That the Veterinary Inspector be allowed the attendance and assistance of any officer or officers he may require, and that any case of doubt or difficulty be immediately referred to the collector.

(Signed) J. W. Wood,
Collector.

Custom House,
3d October 1865.

St. Petersburg Steam Ship Office,
20 Mark Lane, London,
19th December 1865.

Sir,

I beg to acknowledge the receipt of your letter of the 1st instant, asking for information relative to the import of cattle.

In reply I beg to state that at the wharf where we have been in the habit of landing cattle there exist facilities for both the watering and feeding of cattle during the time they may be detained for veterinary examination, or otherwise.

It is the invariable practice of the captains of our steamers to have them thoroughly cleansed after the discharge of the cattle; and in cases where we have vessels exclusively employed in the conveyance of cattle, they are regularly washed throughout on the outward voyage with warm water from the engines (a pump being fitted for the purpose), and the holds from time to time white-washed and disinfected.

Our vessels are constructed specially for the conveyance of cattle, and are most carefully fitted with stalls and pens for the proper separation and prevention of overcrowding of the cattle, consequently the loss has been very trifling indeed. In some trades we import the cattle on our own account; in others, when a loss occurs, we have to make some compensation to the owners.

For a long time we have had the cattle carefully examined by competent veterinary surgeons at the ports of shipment, and have notified the shippers that if any attempt is made by them to ship diseased cattle of any kind we will decline to carry for them in future; the results are most satisfactory, as scarcely an instance has occurred where cattle have been stopped by the veterinary surgeons on this side, and I am not aware of any really diseased cattle being found, with the exception of one case of lung disease from Holland, and one cargo of cattle from Oporto which were suffering more or less from foot and mouth disease.

I am, Sir, .

The Secretary,
Cattle Plague Commissoners,
House of Commons.

Your obedient servant,
A. G. Robinson.

General Steam Navigation Company,
Chief Office, 71 Lombard Street, London,
3rd January 1866.

Sir,

I beg to acknowledge the receipt of your letter of the 1st ultimo, requesting information with reference to the transport of cattle by sea, and as to local facilities for inspection, and for the temporary detention of cattle, in connection with the vessels belonging to the General Steam Navigation Company, and employed in the cattle trade, and upon other points relating thereto.

In reply, I am instructed by the Directors to state that the steamers of the company engaged in the conveyance of cattle, sheep, &c., are thoroughly cleansed immediately after the delivery of the animals, the holds and decks being well-washed, and disinfecting fluid (chloride of zinc) liberally applied.

This process is observed after each voyage, and occasionally the holds are limewashed, and other measures adopted in order to secure the utmost possible freedom from effluvia or unwholesome effect from the nature of such cargoes.

* This paper is printed in Appendix B. to the Commissioners' First Report, but for the sake of convenience it is reprinted here.

The holds of the vessels appropriated for the conveyance of cattle are divided or stalled off by stanchions, rails, and boards, and the compartments for sheep are formed of stanchions, rails, and hurdles; by these means, and the ample space allowed for the animals, all overcrowding is entirely prevented.

In most instances the cattle are attended on board the vessel by drovers appointed by the shippers, who provide the necessary food for the cattle, the ship having a plentiful supply of water in tanks for the use of the animals during the voyage.

The cattle, sheep, &c., brought by the Company's steamers are landed either at Brown's Wharf, Blackwall, or St. Katherine's Wharf, East Smithfield, where every convenience is provided for the safe landing and keeping of the cattle at any hour, and for the inspection of the same by the veterinary surgeon.

Water is laid on at both wharves for the supply of the animals in any quantity, and, when necessary, fodder is provided for the cattle by the consignees.

The Directors, after many years' experience, are enabled to say that the result of the arrangements on board the Company's vessels for the prevention of disease or deterioration of the cattle has proved highly satisfactory, the animals being brought from the most distant continental ports, landed, and passed to market generally in most excellent condition, the exceptions arising only on the occasion of the vessels having to encounter boisterous weather and heavy sea during the passage.

I am, Sir,
Your obedient servant,
MARTIN PRATT,
Secretary.

The Secretary,
Royal Cattle Plague Commission.

III.—CORRESPONDENCE WITH CATTLE SALESMEN.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.,
27th November 1865.

SIR,

IN the course of your examination before this Commission you adverted to the mode of inspection at the ports; to the detention of animals, in some cases, for the purpose of inspection; to the want of convenient space for this purpose at some of the wharves; and to the absence of inspection for shipping employed in the transport of cattle, and some evils thereby occasioned. I send you herewith a copy of a letter which I have addressed to the Board of Customs, and I have to request that if there is any information which you think might usefully be brought to the knowledge of the Commissioners upon any of the points mentioned in it, you will have the goodness to send such information to me in writing at your earliest convenience.

The Commissioners will, if desired, receive from you or some other gentlemen engaged in the cattle trade oral information on any of the points above mentioned.

I am, Sir,
Your obedient Servant,
MOUNTAGUE BERNARD.

Mr. H. Gebhardt.

Albion Bank, Limited,
Smithfield Branch, London,
4th December 1865.

GENTLEMEN,

IN reply to a letter received from your Secretary, dated 27th November, I beg to draw the Royal Commissioners' attention to the following remarks:

First.—As regards the transport of cattle. Cattle should only be allowed to be shipped to England in paddle steamers, as it is a proved fact that screw steamers damage and kill a great many more cattle than paddle steamers.

The majority of steamers engaged in the foreign cattle trade are paddle, but a few are screws, and they do more mischief than all the paddle steamers together.

Second.—Each steamer should be inspected as regards space, and only so many animals should be allowed according to the size of the steamer.

There is great opposition in this trade; one company carries them for less freight than another, and to make up for low rates the cattle are packed as close as herrings; the consequences are, dead, damaged, and bruised animals. Every steamer that carries cattle should have plenty of partitions, so that no more than three or four oxen stand in one place; and also that they should have room to lie down. It would be much more profitable to the owners of cattle to pay higher freight, and have their stock delivered in a good condition, than the present cheap freights, and delivered in a bad one.

Third.—The ventilation in some steamers is very bad. I can prove instances where lots of oxen and sheep were smothered in fine weather for want of ventilation and from being overcrowded.

As regards the landing-places for cattle, they are as bad and insufficient as can well be imagined. The wharves answered very well when the trade was small, but as the importation increases every year there is not one wharf at present adapted to the purpose. It is frightful to witness the sufferings the cattle are exposed to during the time that they are obliged to remain there, particularly in the winter season.

As no cattle are allowed to leave the wharves unless inspected, and as this is only done in the daytime, cattle have sometimes to remain at the wharf from five in the afternoon till 9 or 10 o'clock next morning, some standing in the street, others in open places, without the slightest chance of receiving shelter, water, or hay.

Cattle are not allowed to be driven on a Sunday, so that if they arrive too late to be passed on Saturday afternoon (the time when most steamers arrive) they must remain till Sunday night. The landing of cattle lower down the river at Thames Haven, &c. is worse still, and if the cattle have had a rough passage, and in consequence are tired and lame, when they are put in railway trucks they fall one on the other, and arrive in London in so bad a condition that they frequently have to be killed at the railway station.

My experience has shown me that the comparative few cattle which now arrive by rail come in a bad condition, and it would be still worse if all had to come by the same means; or, if insisted upon by Government, great alterations ought to be made.

In my opinion the best place to land cattle is Blackwall, provided proper places were made where cattle after being landed could be brought under cover, and obtain water and hay until they were passed by the doctor.

Blackwall is a convenient place near the market, and a great many beasts and sheep are driven from there to fields and lairs near Tottenham, only touching London on the outskirts, passing through Poplar, by Victoria Park, Hackney, and Clapton, avoiding all crowded thoroughfares.

I shall be very happy to wait upon the Royal Commission, if they should wish to examine me more fully, but must request that I may not be called either Monday or Thursday, those being market days.

I am, Gentlemen,
Your most obedient Servant,
H. GEBHARDT.

To the Royal Cattle Plague Commissioners.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.
11th December 1865.

SIR,

I AM desired by Her Majesty's Commissioners for inquiring into the origin, &c. of the Cattle Plague to ask you, as an importer of cattle carrying on a large business, to be good enough to furnish them with information on the following points:—

I. Whether at the Port of London, or at any other ports which as an importer you may be acquainted with, sufficient room and accommodation are provided (1.) for the inspection of imported cattle; (2.) for detaining them until they can be inspected; (3.) for keeping suspected animals in quarantine, when this is deemed advisable?

II. Whether it would in your opinion be advisable, as to vessels employed in the cattle trade, that regulations should be made by authority (1.) to ensure their being cleansed and disinfected after every voyage; (2.) to ensure the cattle being fed and watered on the voyage; (3.) to prevent them from being overcrowded: or whether, as the trade is now conducted, any such regulations are in your opinion unnecessary?

You would further oblige the Commissioners by giving them any information which you may possess on the following points:—

III. What inspection, examination, or quarantine, horned cattle, sent to Hamburg or Rotterdam from Galicia or Hungary (or from Bessarabia or Podolia through Galicia), would have to undergo between the beginning and the end of the journey?

IV. What would be the average time which such attle would take on the journey from Vienna, or from the

Galician frontier to England, and what the quickest time within which the journey could practically be done?

I am, Sir,
Your obedient Servant,
MOUNTAGUE BERNARD.

Mr. Pool,
Cattle salesman,
17, West Smithfield.

14, Mount Place, Whitechapel Road,
Dec. 20, 1865.

SIR,

In answer to yours of 11th instant I have much pleasure in forwarding following answers :—

I. (1.) Not sufficient standing room at any wharf in the Port of London for the large quantity of cattle at present imported.

(2.) Decidedly not. The wharves being so deficient of space, the Inspectors are compelled to inspect the cattle outside of them, namely, in the open streets.

(3.) Not sufficient accommodation for keeping a large quantity of cattle in quarantine.

II. (1.) In my opinion such authority would be extremely advisable for the health of the cattle.

(2.) If such could be practically accomplished would be a great benefit for the welfare of the cattle.

(3.) I consider the vessels generally very much overcrowded, and regulations for space much needed.

III. The cattle are inspected in Hamburg and Rotterdam, previous to their being shipped for exportation, by members of the Royal Veterinary College especially appointed for that purpose, and any cattle infected or suspected with the foot and mouth or any other disease are prohibited from being shipped.

As regards the other places mentioned in your question I am not acquainted with the mode of examination or quarantine.

IV. Cannot state.

I am not acquainted with the landing places for cattle at Thames Haven or Harwich, but Southampton I consider the best and most commodious.

At Newhaven there is no accommodation whatever.

I must call your attention that at times too many horned cattle are placed in one pen on board the steamers; and further, that the manner in which small cattle are placed on the bridges and also on deck, one tier above the other, tends to impoverish them, and should be prohibited; and further must beg to state that cattle at times are kept too long on the railways in transit.

Any further information required will be readily given by

Your very obedient Servant,
EDWARD MAGNUS,
per pro
MARCUS POOL.

Mountague Bernard, Esq.

APPENDIX C.

CONVEYANCE OF CATTLE BY RAILWAY.

CORRESPONDENCE with various RAILWAY COMPANIES on (1) the cleansing of Trucks and Pens; (2) the course adopted with reference to Cattle appearing to be diseased; (3) the covering of Cattle Trucks; and (4) the facilities afforded for the watering and feeding of Cattle.

THE circular printed below was forwarded to the following Railway Companies. The answers received are presented in a tabular form in pp. 48–55; and the regulations of which copies have been received will be found in pp. 56–63:—

Caledonian.
Glasgow and South-western.
Great Eastern.
Great Northern.
Great Southern and Western (of Ireland).
Great Western.
Lancashire and Yorkshire.
London and Blackwall.
London, Brighton, and South Coast.
London, Chatham, and Dover.
London and North-western.
London and South-western.
Manchester, Sheffield, and Lincolnshire.
Midland.
Midland Great Western (of Ireland).
North British.
North-eastern.
North Staffordshire.
Scottish North-eastern.
South Devon.
South-eastern.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.
11th December 1865.

SIR,

I AM directed by Her Majesty's Commissioners for inquiring into the Origin, &c. of the Cattle Plague, to request that the Directors of the
Railway will have the goodness to cause answers to the subjoined questions to be sent to me, for the information of the Commissioners, as soon as conveniently may be.

Railways, along which large quantities of cattle are being continually conveyed, in close contact with one another, and in trucks which are in constant use, may, in the absence of due care and precaution, assist in the dissemination of disease. The Directors of the
Railway are doubtless perfectly sensible of this; and the Commissiouers feel assured that they will willingly furnish all such information on this head as it is in their power to afford.

I am, Sir,
Your obedient servant,
MOUNTAGUE BERNARD,
Secretary.

The Chairman of the Board of Directors
of the
Railway Company.

1. Are the cattle trucks on the Railway cleansed after every journey?

2. How are they cleansed? Is any and what disinfectant employed in cleansing them?

3. Who is responsible for their being properly cleansed?

4. Are the pens or yards belonging to the company, into which cattle are driven before being put into the trucks or after being discharged from them, cleansed, and how often, and who is responsible for this?

5. Are any general directions or regulations issued to the officers or servants of the company on the above heads?

6. Are any general directions issued to the company's officers or servants respecting cattle, in the company's trucks or pens, appearing to be diseased?

7. If so, in how many instances have these directions been acted on since the 1st of June last?

8. Are any, (and, if so, what proportion) of the trucks in which cattle are conveyed covered, wholly or partially, at the top or sides? Would there be any difficulty in providing covered trucks, or any objection to it?

9. Are there any general directions or regulations respecting watering or feeding of cattle during a journey, or for enabling them to be watered or fed, if desired by the owner or his agent?

10. If such facilities for feeding or watering are given, are they often used; or is the inconvenience of unloading trucks of the ordinary construction and loading them again found to be an obstacle to this?

11. Are trucks which enable cattle to be watered and fed without being removed on the journey in use on your railway? Have the directors considered the expediency of adopting them, and do they see any objection to it?

12. Please to furnish a copy of any general directions or regulations which may be in force on the company's railway on any of the above heads, or respecting cattle traffic in general, specifying which, if any, of them are temporary, and which of them have been issued since the 1st of June last.

Copies of the Documents referr

Name of Railway Company.	1. Are the cattle trucks on the Company's railway cleansed after every journey?	2. How are they cleansed? Is any and what disinfectant employed in cleansing them?	3. Who is responsible for their being properly cleansed?	4. Are the pens or yards belonging to the Company, into which cattle are driven before being put into the trucks or after being discharged from them, cleansed, and how often, and who is responsible for this?	5. Are any general directions or regulations issued to the officers or servants of the Company on the above heads?	6. Are any general directions issued to the Company's officers or servants respecting cattle, in the Company's trucks or pens, appearing to be diseased?	7. If so, many in have th rections acted on the 1st last?
Caledonian -	They are -	They are swept out, and thoroughly washed with water. They are disinfected with chloride of lime and quicklime.	The station agents, under the cattle traffic superintendent.	The pens are all painted with coal tar, and the yards are regularly cleansed and all refuse taken away, and the station agents are responsible.	There are general directions issued to the station agents, viz., "You will cause all cattle waggons at your station to be properly cleansed out and thoroughly washed with water before being used. Dung and other refuse must be regularly taken away from the pens, and fresh gravel used where the pens are not paved."	There are general directions issued for cattle appearing to be diseased, viz. [Here follows the description of the symptoms of the disease given in the Order of Council of the 11th August, 1865.]	They hav acted on 26th last, an have no di cattle t knowled
Glasgow and South-western.	Yes - -	Water and chloride of lime.	The various agents placed at the different stations of the Company.	It will be seen by the enclosed orders to the agents, that all these are dealt with the same as cattle waggons, and the agents are responsible for seeing this done.	Yes; orders 36, dated 10th August, and 40, dated 23rd August 1865.	Yes; see above -	Always necessar cannot scend o number times.
Great Eastern.*	Yes - -	By means of brooms and lime mixed with water.	The station master in each case.	The pens are cleansed in the same manner as the trucks after each lot of cattle has been removed from them.	Yes - - -	The instructions on this head are merely "copy" of the Orders in Council. A printed copy is attached.	Not any ca
Great Northern.	Yes - -	Always swept and frequently washed. Chloride of lime is most generally used, but in some cases McDougall's powder.	The station masters, and at large stations the outdoor inspector.	Yes; they are kept constantly cleansed.	Yes. Copies of instructions attached.	Yes. See the accompanying directions.	I cannot that any seased c have been ceived at stations.
Great Southern and Western (of Ireland).	Yes - -	By brushing and sweeping. No disinfectant used; but this would be immediately attended to on the first appearance of disease.	Station masters -	As often as required, under supervision of station masters.	See annexed copy of order issued.	No instance of cattle disease has yet come under the Directors' notice.	See No. 6 -

* The following letter was forwarded with the answers :—

SIR,

I beg leave to state that the answers given in the enclosed document apply only to our Inland Cattle Traffic.

e Answers will be found in pp. 56-63.

Are any (and, if , what proportion) of the trucks which cattle are nveyed covered, holly or partially, the top or sides? ould there be any fficulty in providing covered ucks, or any objection to it?	9. Are there any general directions or regulations respecting watering or feeding of cattle during a journey, or for enabling them to be watered or fed, if desired by the owner or his agent?	10. If such facilities for feeding or watering are given, are they often used; or is the inconvenience of unloading trucks of the ordinary construction and loading them again found to be an obstacle to this?	11. Are trucks which enable cattle to be watered and fed without being removed on the journey in use on your railway? Have the Directors considered the expediency of adopting them, and do they see any objection to it?	12. Please to furnish a copy of any general directions or regulations which may be in force on the Company's railway on any of the above heads, or respecting cattle traffic in general, specifying which, if any, of them are temporary, and which of them have been issued since the 1st of June last.	Name of Railway Company.
ut two-thirds of e cattle waggons e covered at the o.	If the owner or his agent desires the cattle to be watered or fed, it can be done at the principal terminal stations on the Caledonian line.	They are not often used, the loading and unloading being considered an obstacle.	There are no trucks which enable cattle to be watered and fed on journey in use on the Caledonian Railway. The Directors have considered the expediency, but have found the present trucks could not be so fitted up. Trucks would require to be specially constructed for such a use.	The general regulations of the Caledonian Railway Company are, that the dealers in cattle have their cattle loaded to their wish, and that for every one waggon to three waggons one drover is carried free by the same train as the cattle to attend to them on the journey. There are no other general regulations but these referred to in clauses 5 and 6, which have been in use since August last.	Caledonian.
have in all 240 ggons, and there about 100 of m covered. me dealers dis- e and will not covered wag- as. My own nion is that cat- travel more nfortably with- covering.	None; the distances on this line over which cattle travel are so short, that this has not been considered necessary, and has never been asked.	See above. Our trucks are of the ordinary construction, similar to what are used in England on leading lines.	These are not in use, and no demand for them. To water cattle on the way would cause great delay.	See answer to Article 5 - -	Glasgow and South-western.
er more than -half of our tle trucks are ered at the top, y partially so at sides. There is objection what- r to covered cks; they are an antage, and we stitute them for pen" ones when v vehicles are ered by the npany.	The longest distance that cattle travel on this railway is 120 miles, and these are generally in charge of drovers who look after the beasts on the road. For our London cattle we provide at Tottenham and Stratford, which are the two stations where the London cattle are landed, water-troughs, always kept filled with water when cattle are expected. At Tottenham we possess also lairs, where the cattle are housed, fed, and watered, if the consignees request it.	Facilities are not given by the Company for feeding during transit. The drovers in charge look after the beasts. The time occupied in unloading and loading up again would be a barrier to the cattle being fed at the Company's stations on the road.	No. The Directors have not considered the expediency of them on account of no cattle being conveyed over this line a distance of more than 120 miles.	Attached are copies of all the instructions which have been issued. They have all been issued since the 1st June last.	Great Eastern.
the Great- thern cattle ggons are co- ed.	No. The owners or their drovers have a free pass to travel with their cattle for the purpose of attending to them on the journey.	The only facilities are contingent on the cattle being unloaded and reloaded after watering; which in practice is found to be impossible.	No practical method has yet been found for watering cattle in the trucks when in full truck loads.	Copies attached - - -	Great Northern.
greater portion trucks used are ered at top and s.	None. No application of this nature has ever been made to the Company.			See Rule No. 5 - - -	Great Southern and Western (of Ireland).

have intentionally limited them to that description of traffic, because the nature of the questions has led me to think they do not apply to reign Cattle Trade.

I am, &c.
R. Moseley, per Wm. Bent.

Copies of the Documents referr

Name of Railway Company.	1. Are the cattle trucks on the Company's railway cleansed after every journey?	2. How are they cleansed? Is any and what disinfectant employed in cleansing them?	3. Who is responsible for their being properly cleansed?	4. Are the pens or yards belonging to the Company, into which cattle are driven before being put into the trucks or after being discharged from them, cleansed, and how often, and who is responsible for this?	5. Are any general directions or regulations issued to the officers or servants of the Company on the above heads?	6. Are any general directions issued to the Company's officers or servants respecting cattle in the Company's trucks or pens, appearing to be diseased?	7. If so, i many ins have the rections acted on the 1st o last?
Great Western.*	Yes, at the inwards station, except in special cases when there is not time to do so before returningthem, when it is done before the truck is again loaded.	They are scraped and brushed, and on arriving washed with water; but it is now the rule that they are frequently to be placed under the hose and occasionally strewed with chloride of lime.	1. The station master of each station, and the staff under him. 2. The District Superintendent and District Goods Manager are responsible to see that the regulations are carried out. 3. There are two travelling cattle traffic inspectors, whose duty is to report to the Superintendent and Goods Manager any case in which the trucks are not properly cleansed.	Yes, same as No. 3.	Yes; copy sent herewith.	See No. 5 - -	If by this tion is In how cases diseased mals found Compan mises? though Compan employe terinary geonsoc ally, whe have bee tle c from fa no cas any anin fected the rind been dis ed; but instance infected the sma or other disease, refused destroye
Lancashire & Yorkshire.	Yes - -	They are well washed with water, and afterwards disinfected with chloride of lime.	Station agents and inspectors.	Yes, as often as is necessary. Agents and inspectors are responsible.	Yes; copies sent herewith.	Yes; see clauses 4, 5, 6, 7, in General Order, No. 308.	Only on stance disease h curred o line up present t
London and Blackwall.‡							
London, Brighton, and SouthCoast.	Yes - -	They are thoroughly scraped and disinfected. See Rule 4 in attached circular.	The station agents and foremen.	Yes; by station masters, as occasion requires.	See three notices attached.		Only one has been ported.

* The following letter was forwarded with the answers:—

SIR, Great Western Railway, General Manager's Office, Paddington Station, London, 16th December 18

IN forwarding the replies to the inquiries made by the Royal Commission, I have to state that the Directors of this Company have continu given their most anxious consideration to the subject, and they will be willing to fall in as far as possible with any regulations that can b down for the conveyance of live stock, or, if necessity should require that for a time the traffice should be discontinued, they will be prepar make such arrangements as may be necessary, and to afford every facility for the transit of meat to the metropolis and between all the through which the railway passes.

I am, &c.

J. GRIERS

† The following letter refers to a case of disease observed on the Great Western Railway in December 1865.

SIR, Great Western Railway, General Manager's Office, Paddington Station, London, 30th December 1

YOU will have observed in the "Times" of the 23rd inst. a paragraph stating that two trucks of cattle were conveyed by the Great W line to Birmingham, found to be diseased, and ordered to be destroyed by the cattle inspector; and I beg to explain that when the cattle delivered to this Company at Wrexham they were examined and certified by the cattle inspector to be free from disease, and might be all to travel for the purpose of slaughter.

On arrival at Birmingham the Company's foreman observing something which induced him to think that one of them had not been in a h state, called in the cattle inspector, who required them to be killed upon the spot, but allowed the carcases of all of them to be removed, wit exception of one, which was buried seven feet below the surface and covered with quick-lime.

The trucks were thoroughly cleansed out and disinfected with chloride of lime and afterwards painted; and they will not be allowed to be for any purpose whatever for a short time.

I am, &c.

J. GRIERSO

Answers will be found in pp. 56–63.

e any (and, if what proportion) of the trucks which cattle are veyed covered, lly or partially, ie top or sides? uld there be any culty in providing covered trucks, ny objection to	9. Are there any general directions or regulations respecting watering or feeding of cattle during a journey, or for enabling them to be watered or fed, if desired by the owner or his agent?	10. If such facilities for feeding or watering are given, are they often used; or is the inconvenience of unloading trucks of the ordinary construction and loading them again found to be an obstacle to this?	11. Are trucks which enable cattle to be watered and fed without being removed on the journey in use on your railway? Have the Directors considered the expediency of adopting them, and do they see any objection to it?	12. Please to furnish a copy of any general directions or regulations which may be in force on the Company's railway on any of the above heads, or respecting cattle traffic in general, specifying which, if any, of them are temporary, and which of them have been issued since the 1st of June last?	Name of Railway Company.
y one-half are ered. whatever. We d all new trucks vered," and are building 150.	None. Experiments have been tried by putting pails of water in the trucks, but in no case have the cattle drunk. Indeed, the best information we have is that they will not do so (probably from nervous excitement) until they have been loaded for two or three hours. The objection to the unloading of cattle for this purpose is the delay thereby caused. The Directors are not only willing but anxious to fall in with any *practicable* scheme which will prevent any suffering and keep up the condition of cattle in transit.			Copies of some of the orders are sent herewith. No. 1 is permanent. No. 2 was issued prior to the recommendation of the Royal Commission, is now in force, but was intended to be temporary.	Great Western.
attle trucks of Company are covered, and e would be siderable difficy in providing ered trucks.	No; the distances which cattle are conveyed over this line are not so long as to render necessary any arrangement for watering or feeding cattle, and generally men who have charge of the cattle travel with them and attend to them.	See answer to preceding question.	No, we have not found it necessary to use such trucks, for the reason stated in the answer to question No. 9.	Copies sent herewith - - -	Lancashire & Yorkshire.
					London and Blackwall.
ur trucks are ered.	No, our distances being so short; but there are troughs in the principal station yards.		See answer to questions 9 and 10.	Three notices enclosed - -	London, Brighton, & South Coast.

e following letter was received in reply:—

London and Blackwall Railway Company, Offices, London Terminus, Fenchurch Street, E.C., 15th December 1865.

I AM instructed to acknowledge receipt of your circular letter of the 11th inst., addressed to the Chairman of the Board of Directors of this any, requesting answers to certain questions having reference to the conveyance of cattle by railway, for the information of Her Majesty's issioners for inquiring into the origin of the Cattle Plague.

eply, I have to acquaint you that no cattle are conveyed upon this railway, and that the Company do not possess any cattle trucks.

, however, desired to acquaint you that cattle from foreign ports are landed, under the superintendence of the Customs, at the Brunswick Blackwall, and driven thence by road to market. Upon this wharf there is a warehouse which is used in connexion with the business, and ach cargo is landed the warehouse is thoroughly cleansed and disinfected with chloride of lime, and the walls, &c. are occasionally washed ime.

I am, &c.
JOHN F. KENNELL, Sec.

Copies of the Documents referre

Name of Railway Company.	1. Are the cattle trucks on the Company's railway cleansed after every journey?	2. How are they cleansed? Is any and what disinfectant employed in cleansing them?	3. Who is responsible for their being properly cleansed?	4. Are the pens or yards belonging to the Company, into which cattle are driven before being put into the trucks or after being discharged from them, cleansed, and how often, and who is responsible for this?	5. Are any general directions or regulations issued to the officers or servants of the Company on the above heads?	6. Are any general directions issued to the Company's officers or servants respecting cattle, in the Company's trucks or pens, appearing to be diseased?	7. If so, in many inst have thes rections acted on the 1st of last?
London, Chatham, and Dover.	As a rule the trucks, if fouled, are cleaned out.	When the Cattle Plague first broke out, the whole of the cattle trucks were disinfected by thorough washing and scraping, and by limewashing thoroughly. This is repeated from time to time.	Cattle inspector and station agent.	Yes, as frequently as possible, and under the instructions of station agent and cattle inspector.	Circulars (copies of which are attached) have been issued to all the staff.		No case arisen of eased being pre at a statio detected w on the rai
London and North-western.	Stringent orders have been issued for the cattle trucks to be cleansed.	They are ordered to be swept out, whitewashed and disinfected with a powder of which chloride of lime forms the principal ingredient.	The agents at the respective stations.	After the removal of each lot of stock. The agent is the responsible party.	Prints of circulars herewith.	Prints of circulars herewith.	Only one has arise
London and South-western.	Yes, as a general rule.	Washed out with chloride of lime.	The superintendents at the various stations.	Occasionally -	Yes - - -	Yes - -	Cannot this.
Manchester, Sheffield, & Lincolnshire.	Yes - -	With lime-wash and McDougall's disinfectant.	The station masters and inspectors.	Pens cleansed regularly and limewashed. Station masters and inspectors responsible.	Yes. Rule 251 in the Company's general regulations requires "cattle waggons to be thoroughly cleansed immediately after being unloaded;" and since the outbreak of the cattle plague special instructions have been issued requiring all cattle waggons to be thoroughly disinfected in addition.	Yes. The Company's servants have been instructed to prevent any cattle which appear to be suffering from disease from coming on to the Company's premises, and in the event of such being offered, or received loaded at any station to give immediate information to the duly authorized public officer.	No single of cattle p plague come u our obs tion.
Midland.	Yes - -	By limewash and carbolic acid.	The station master or agent.	They are cleansed twice a day according to the amount of traffic. The station agent is responsible for this being done.	Yes - -	No - - -	See No. 6.
Midland Great Western (of Ireland).	Yes - -	Scraped and swept. Saw dust and bog mould.	Cattle platform foreman.	Yes, daily. Cattle platform foreman.	Yes - - - -	No - - -	See No. 6 -
North British	They are ordered to be cleansed after every occasion of their being used.	They are scraped and washed with hot water when it can be procured; with cold water when it cannot be procured.	The station agent receiving the truck is responsible for the truck being properly cleaned.	The pens or yards are cleaned after use. The station agent is responsible for the duty.	The station agent has general directions on the above subjects.	There have been no general direct respecting cattle in the Compa trucks or pens appearing to be eased, but instructions will be is at this date.	

Answers will be found in pp. 56–63.

e any (and, if what proportion) of the trucks hich cattle are eyed covered, lly or partially, e top or sides? ld there be any ulty in providing covered trucks, ny objection to	9. Are there any general directions or regulations respecting watering or feeding of cattle during a journey, or for enabling them to be watered or fed, if desired by the owner or his agent?	10. If such facilities for feeding or watering are given, are they often used; or is the inconvenience of unloading trucks of the ordinary construction and loading them again found to be an obstacle to this?	11. Are trucks which enable cattle to be watered and fed without being removed on the journey in use on your railway? Have the Directors considered the expediency of adopting them, and do they see any objection to it?	12. Please to furnish a copy of any general directions or regulations which may be in force on the Company's railway on any of the above heads, or respecting cattle traffic in general, specifying which, if any, of them are temporary, and which of them have been issued since the 1st of June last?	Name of Railway Company.
e cattle trucks roofs, but are at the sides. derable difficulty would be experienced in providing trucks enenclosed, there would elay and danger in loading in such s, besides imnt risk to the from suffo-	As cattle are generally carried on this line in special trains, and the whole distance run is short, no necessity appears to have arisen for any systematic watering; but a cattle inspector, specially appointed to attend to this business, generally travels with the trains and sees that the animals are attended to properly.	See former answer -	Yes - - - -	The treatment of cattle is regulated by the inspector before adverted to, who visits the various stations and instructs the staff.	London, Chatham, and Dover.
rucks in all, hich 385 are ed.	As regards the journey, no arrangements are in force for watering or feeding cattle; but at different points where cattle are received facilities are afforded to consignors and owners of stock.			Prints of circulars herewith -	London and North-western.
on covered at p, all covered sides.	No regulations, but every facility given.	Very seldom used -	No; the journeys are not so long as to require this.	Herewith - - - - - -	London and South-western.
half our stock ttle waggons overed. All waggons are ed to be ed.	We have no regulations in reference to watering or feeding of cattle during a journey, nor have we ever received any application from owners of cattle to perform such service.	The unloading and loading again of cattle for the purpose of watering would be a serious inconvenience.	The cattle trucks in use on this railway are of the kind in use on all railways, and are not so fitted up as to enable cattle to be watered and fed without being unloaded.	Copies of regulations attached hereto, as requested.	Manchester, Sheffield, & Lincolnshire.
ered, 230 unod. ction; all restock are made covered.	If necessary, water is given the cattle. The feeding is seen after by owners or their servants, who accompany them.	See No. 9 -	No. They have considered it; but not yet decided to adopt them.	Herewith - - - - -	Midland.
re conveyed ially covered uncovered ns.	None - - - -	- - - - -	No - - -	Circular attached - - -	Midland Great Western (of Ireland).
erof the Comtrucks, the ilt, have been d at the top nds. There be difficulty covering the nd tops of ns originally nected.	There are no directions or regulations respecting the watering or feeding of cattle during a journey, or for enabling them to be watered or fed. There have been no demands on the Company for such provision being made. The necessary speed of the trains by which the cattle are conveyed forbids the watering or feeding of cattle by such trains, unless they be shunted from the train to the station and resume their journey by a subsequent train. To do this, no one would object more than the owners of the cattle themselves. It would be physically impossible to water and feed cattle on the respective journeys occupying the respective periods. The Company do, however, carry the servants of the owners of the cattle in their trains free, for the purpose of attending to the cattle. The difficulty of watering and feeding does not depend on the construction of the waggons, but on the delay absolutely necessary to the discharging, feeding, reloading		There have hitherto been no trucks constructed which would admit of cattle being fed in them, nor is it thought that such trucks can be constructed.	Copies herewith - - - -	North British.

Copies of the Documents refer

Name of Railway Company.	1. Are the cattle trucks on the Company's railway cleansed after every journey?	2. How are they cleansed? is any and what disinfectant employed in cleansing them?	3. Who is responsible for their being properly cleansed?	4. Are the pens or yards belonging to the Company, into which cattle are driven before being put into the trucks or after being discharged from them cleansed, and how often, and who is responsible for this?	5. Are any general directions or regulations issued to the officers or servants of the Company on the above heads?	6. Are any general directions issued to the Company's officers or servants respecting cattle in the Company's trucks or pens appearing to be diseased.	7. If so, many ir have th rection acted the 1st last?
North-eastern	Yes - -	They are scraped and swept out. Chloride of lime is used in cleansing them.	The agents at the principal stations are primarily responsible. They report weekly to the district inspector, who is constantly going over his district to see that the work is properly done.	The yards are cleansed weekly, the agents at the several stations being responsible.	Yes; see copies attached.	Their orders are not to receive any such cattle, but to report the circumstance immediately to the nearest police officer or magistrate, as well as to the goods manager of their district. If such cattle arrive from any other station, they are at once to inform the cattle inspector appointed by the magistrates.	Three times s orders issued.
NorthStaffordshire.	Yes - -	By well washing and scraping them. The disinfectants used are caustic soda, quicklime, chloride of lime.	The Company's foreman at Stoke and the agents or station masters at the various stations.	Yes, they are cleaned every time; and the same persons are responsible as stated under No. 3 question.	Yes - -	Yes - - -	I do not stand th tion, u means, many i have w vered t were co diseased or, In manyin have v fused t cattle count ease? we ha had a known disease.
ScottishNortheastern.	They are -	Washed, and then whitewashed with lime. No other disinfectant used.	The station agents.	There have been no orders issued to clean the pens or yards on every occasion; but as that may be necessary the station agents will be instructed to have it done.	Enclosed are copies of three orders, one issued on 17th August, another on 4th September, and another 21st October.	No diseased animal is allowed to enter the Company's premises, nor anywithout a certificate from a district inspector that they are free from disease.	In no ins
South Devon	Yes, after they have been used for conveyance of cattle.	Washed out with water and sprinkled with Burd's disinfecting powder.	The officers in charge of the respective stations.	The pens are occasionally whitewashed.	Yes - -	Instructions are given not to receive diseased cattle, and to require the certificate of senders that their cattle are free from disease. If, notwithstanding these precautions, the disease should subsequently appear, the Company would desire to know how they are to act.	See last a
South-eastern	Yes - -	By limewashing	The station masters	They are frequently cleansed, but not as a rule immediately before or immediately after being used. The station masters responsible.	Yes - -	No; but certainly no cattle having the appearance of disease would be received.	See No. are not of any carried were di

Answers will be found in pp. 56–63.

e any (and, if what proportion) of the trucks hich cattle are reyed covered, lly or partially, e top or sides? ld there be any ulty in providing covered ks, or any objection to it?	9. Are there any general directions or regulations respecting watering or feeding of cattle during a journey, or for enabling them to be watered or fed, if desired by the owner or his agent?	10. If such facilities for feeding or watering are given, are they often used; or is the inconvenience of unloading trucks of the ordinary construction and loading them again found to be an obstacle to this?	11. Are trucks which enable cattle to be watered and fed without being removed on the journey in use on your railway? Have the Directors considered the expediency of adopting them, and do they see any objection to it?	12. Please to furnish a copy of any general directions or regulations which may be in force on the Company's railway on any of the above heads or respecting cattle traffic in general, specifying which, if any, of them are temporary, and which of them have been issued since the 1st of June last?	Name of Railway Company.
half the cattle gons in use on railway are red at the top, all are covered ally at the . All the tle waggons during the reeyears, whe- as additional , or to replace ones, have red tops. would be ulty in putting red tops to gons originally as open wag- .	No. Cattle cannot be fed and watered without being untrucked. This causes great delay and a certain amount of injury. When drovers are not present the Railway Company knows nothing of the ownership of the individual animals, but only that those in a particular waggon belong to a particular person. If the animals were untrucked, they would get mixed, and the waggon at the end of the journey would be found to contain different stock from that which was put into it at starting, and serious questions of liability and endless confusion would arise. The owners of cattle going short distances would not allow their cattle to be detained because there were cattle in the same train going long distances which were to be fed and watered on the journey. Cattle also are frequently carried in goods trains, and the goods could not be detained while the cattle were being untrucked, fed, watered, and loaded again. Dealers prefer that their cattle be carried through as quickly as possible.	See previous question and answer.	There are no such trucks in use on this railway, and the Directors have not considered the expediency of adopting them.	See answer to question 5 - -	North-eastern.
attle waggons neither wholly artially covered.	We have no general directions or regulations as to watering or feeding cattle during a journey; but the owner or his agent can, if desired, water or feed his cattle on the average every fifteen miles or so.	The facilities for watering are occasionally used for feeding, but very rarely; the inconvenience of unloading trucks and loading them again would beyond doubt be a very serious obstacle, unless once or so, on a very long journey.	No; but with a bucket there is not the slightest difficulty in watering cattle in the trucks now in use on this railway, nor do I see any great difficulty in feeding them.	Copy of instructions attached -	North Staffordshire.
n. It would a long time considerable nse to cover ucks, and the ing increases eight.	There is no provision for watering and feeding on this line. The journey is short; and the Company have never been asked to make any provision.	- - - -	The attention of the Directors has never been called particularly to the subject.	See the copies referred to in answer to No. 5. Besides these, the goods manager has been advising the agents in any special cases.	Scottish North-eastern.
f the cattle s are covered. jection exhat of expense exist to the ing of the reder.	None. The length of the South Devon Railway, from Exeter to Plymouth, is 53 miles, and a water trough exists at the latter station for use of cattle on arrival or departure. Our rates do not include the cost of food. In any extreme case the station master would use his discretion as to feeding or watering cattle, and special instructions given by consignors would be attended to.		The trucks are not provided with conveniences for feeding and watering; and having regard to the length of the South Devon Railway, and to the fact that no representations are made by owners on the subject, it would not appear necessary to provide them.	Furnished - - - - -	South Devon.
vered at the ll are partially ed at the sides. would be obnable.	No; but there are at some of the stations water troughs.	Entirely at the discretion of the drovers. No.	No. The journeys are so short that there is not any necessity.	See instructions attached - -	South-eastern.

COPIES OF DOCUMENTS REFERRED TO IN THE ABOVE ANSWERS.

GLASGOW AND SOUTH-WESTERN RAILWAY.

Order, No. 36.—Notice to Agents.—Cattle Plague

To prevent the spread of this cattle disease, it will be necessary you see that every waggon in which cattle arrive at your station be washed out before you send it away to any other station, however loaded; and when you have reason to suppose the cattle using the waggon have been diseased, you will be careful in seeing that it is not only properly washed, but disinfected, and that this disinfecting is extended to all troughs, sheds, pens, or anything they have come in contact with, which is likely to be used by other cattle.

A supply of disinfectant (chloride of lime) is sent herewith. When this is nearly done, you will be good enough to apply to me for a fresh supply. This lime must be kept dry and covered up.

W. Johnstone,
General Manager.

General Manager's Office,
Glasgow, 10th Aug. 1865.

Order, No. 40.—Notice to Agents.—Cattle Plague.

The company's agents at the various stations are desired to decline conveying any animal that by their own observation they may consider diseased, and to guide them in this, an excerpt from the Order in Council, signed "Arthur Helps," and dated the 11th August 1865, is hereto appended.

[Here follows the description of the symptoms of disease given in the Order of Council.]

W. Johnstone,
General Manager.

General Manager's Office,
Glasgow, 23rd Aug. 1865.

GREAT EASTERN RAILWAY.

Important.—The Cattle Disease.

G. C. 93.

Manager's Office, Bishopsgate Station,
August 10th, 1865.

All cattle trucks immediately the cattle have been unloaded must be thoroughly cleansed with a bass broom and scraper, the manure so removed being taken at once to the manure pit and there covered with lime.

The truck floors immediately the dung is removed must be thoroughly saturated with lime.

The cattle pens must be swept out as frequently as they are used, and on no account is dung to be allowed to accumulate in them. The pens to be thoroughly saturated with lime in the same manner as the trucks.

For the foreign cattle, through Harwich and Thames Haven, trucks will be set apart specially, and under no circumstances are they to be used for home cattle. They will all be distinguished with a distinctive mark, thus ◆ in white paint, on each side.

I claim your very particular attention in seeing that these instructions are strictly carried out, and if you have not the necessary articles on hand, you may at once purchase brooms, scrapers, and lime.

The accounts for what you purchase must be rendered to the accountant in the ordinary course, this circular being quoted as your authority.

Acknowledge.

Yours obediently,
R. Moseley.

The Cattle Disease.

G. C. 96.

Manager's Office, Bishopsgate Station,
Sir, August 30th, 1865.

Attached herewith I beg to hand you extract from certain Minutes passed at the Council Chamber, Whitehall, on the 11th day of August 1865, respecting the cattle disease.

Be good enough to take care that you render every possible assistance in the carrying out of the instructions which they contain.

It is the anxious wish of the directors to do everything in their power to stay or ameliorate the disease.

Yours obediently,
R. Moseley.

The Station Master,
_____ Station,

[Here follow extracts from the Order in Council of the 11th August, authorizing Mayors and Justices to appoint Inspectors, &c., &c.]

Important.—Cattle Disease.

G. C. 97.

Manager's Office, Bishopsgate Station,
August 29th, 1865.

Referring to my circular, G. C. 93, of 10th instant, I find a misunderstanding exists at some stations as to how the lime is to be used. It is not to be used dry, but must be mixed. Take one pound and a half of Dorking or unslacked lime, and add four quarts of water; allow the lime to dissolve, and when dissolved, well mix it, and then with brush saturate the floor of trucks or pens with the lime wash: care of course being taken to first clean out the trucks or pens of the manure. Lime mixed in the same way is also to be used to saturate the manure pits.

The insides of trucks need not be whitewashed for home cattle. They are to be so only in the case of foreign cattle, as stated in the circular referred to.

Acknowledge.

R. Moseley.

Mr. _____

Station.

Cattle Disease.—Circular, G. C. 97, August 30th.

G. C. 98.

Manager's Office, Bishopsgate Station,
August 30th, 1865.

Referring to the above, it must be clearly understood that the order as to the cleansing of trucks refers to foreign cattle trucks received on our line, as well as our own.

R. Moseley.

The Cattle Disease.

G. C. 99.

Manager's Office, Bishopsgate Station,
September 2nd, 1865.

I send for your information copy of Minute passed at the Council Chamber, Whitehall, on the 26th instant, by the Lords of Her Majesty's Most Honourable Privy Council.

As I have before informed you, it is the desire of the directors to afford every possible assistance in preventing the spread of the cattle disease, and if any cattle should be tendered to you afflicted with the disease, you are to refuse to receive it.

Please acknowledge.

R. Moseley.

[Here follows a copy of the Order in Council of the 26th August 1865.]

The Cattle Disease.

G. C. 106.

Manager's Office, Bishopsgate Station, London,
Sir, September 26th, 1865.

At the foot hereof I beg to hand you copy of Minutes passed at the Privy Council on the 22nd inst., and you will be good enough to see that strict attention is paid to them, so far as they refer to the railway.

In my previous circulars respecting the cleansing of cattle trucks, and the saturating of them with lime, I referred to bullock waggons only, but commencing immediately the same instructions must apply to sheep cages as well, and also to all trucks of whatever kind used for the conveyance of the animals enumerated in the Minutes of the Privy Council.

Please note and acknowledge.

Yours obediently,
R. Moseley.

[Here follows a copy of the Consolidated Order of the 26th September 1865.]

THE CATTLE DISEASE.

G. C. 128. Manager's Office, Bishopsgate,
December 6th, 1865.

SIR,

ATTACHED hereto I beg to hand you copy of Minutes passed at the Council Chamber, Whitehall, on the 23rd November last, and to direct your particular attention to them.

At no time was a strict adherence more necessary to the instructions you have for the purifying of the cattle trucks, cattle pens, and manure bins, than now. The disease, unfortunately, is on the increase, and the directors are determined to leave nothing undone which it is in their power to do to stay it.

Please acknowledge. Yours obediently,
R. MOSELEY.

[Here follows a copy of the Order in Council of the 23rd November 1865.]

GREAT NORTHERN RAILWAY.

(Circular). Goods Department,
London, August 9, 1865.

I HAVE to call the particular attention of the staff to a circular just issued by the National Association for the Prevention of Cattle Diseases,—copy herewith—and to remind all concerned of the instructions already issued, to carefully sweep out and cleanse all cattle waggons after the cattle is unloaded.

I have further to request that the cattle pens and water troughs be kept clean; that any trucks suspected to have been loaded with diseased cattle be thoroughly washed with chloride of lime and water, and that no cattle known to be diseased be accepted for conveyance. Any necessary outlay required for extra labour or chloride of lime for this special purpose, to be charged through the fortnightly pay sheet or district disbursement sheet in the usual way.

JOHN ASHLEY,
Goods Manager.

National Association for the Prevention of Cattle Diseases.

48, Pall Mall, S.W.,
August 5, 1865.

To the Chairman and Directors of the Great Northern Railway Company.

GENTLEMEN,

I AM directed by the Committee of the National Association for the Prevention of Cattle Diseases to draw your attention to the daily extension of the Russian cattle plague, from the transmission of infected and actually diseased stock by railway, or by other means of conveyance. The Committee desires me to suggest that all trucks used for cattle should be kept in a state of the most perfect cleanliness, and in addition to thorough washing by means of water, use should be made of some efficient disinfectant.

I am also directed to point out the great danger of a practice, which is by no means uncommon, of conveying provender and manure in trucks used for the transfer of cattle.

I am, Gentlemen,
Your obedient Servant,
GEORGE ARMATAGE,
Secretary to the Association.

CATTLE DISEASE.

Notice is hereby given, that the officers and servants of this Company have instructions not to receive for conveyance, or allow to remain on the Company's premises, any cattle believed, on reasonable grounds, to be affected with contagious disease, and senders of stock are reminded of the 20*l.* penalty to which they are now liable for consigning diseased cattle by railway.

HENRY OAKLEY,
Secretary.

King's Cross Station,
August 29, 1865.

CATTLE DISEASE.

(Circular). Goods Department, Manager's Office,
London, October 23rd, 1865.

WITH reference to my instructions dated 9th August last, I have to direct attention to the accompanying circular from the Royal Agricultural Society, setting forth the nature of the disease and the necessity for continuing the most stringent measures to prevent its spread.

No precaution must be omitted by the Company as carriers, particularly as regards the acceptance of diseased stock for conveyance, and the cleanliness of the waggons and pens, and as far as possible the directions contained in the Royal Agricultural Society's circular must be adhered to.

JOHN ASHLEY,
Goods Manager.

[Here follows a circular issued by the Royal Agricultural Society of England on the 30th August 1865. It calls attention to the infectious and fatal character of cattle plague; describes the symptoms commonly observed in that and other cattle diseases; specifies various precautions which should be observed in the purchase, housing, treatment, and conveyance of cattle; and remarks upon several other points.]

GREAT SOUTHERN AND WESTERN (OF IRELAND) RAILWAY.

CATTLE PLAGUE.

THE directors have ordered that most particular and urgent instructions be given to station masters to personally see that all trucks arriving at stations, under live stock, be well and effectually cleaned, and when practicable to be washed; and in event of cattle being offered for conveyance by rail, in which there is no reasonable doubt the plague exhibits itself, such cattle shall be refused admission to the company's premises, and report at once made to this office. Station masters will likewise report if they hear that the disease has made its appearance in their neighbourhood.

GREAT WESTERN RAILWAY.

CATTLE TRUCKS.

(C. 92.) General Manager's Office, Goods Department,
Paddington, October 17th, 1857.

DEAR SIR,

COMPAINTS are made that the Cattle trucks are not regularly cleaned out, and that in some cases, in consequence of the accumulation of manure in the bottom of the trucks, the value of the cattle has been seriously deteriorated.

In future, cattle trucks arriving at your station must be immediately cleaned out after the cattle are discharged; and any instance of "empty cattle trucks" not being clean when received at your station, to be reported to me, giving the name of sending station.

Yours truly,
J. GRIERSON.

DIRTY CATTLE TRUCKS.

(C. 190.) General Goods Manager's Office,
Paddington, January 26th, 1861.

DEAR SIR,

REFERRING to my circular 92, of October 17th, 1857, (copy of which I annex), which appears, from the numerous complaints that are made of cattle trucks being used without being properly cleaned out, is not attended to, I have to request that in future the instructions contained in that circular be strictly carried out.

Dirty cattle trucks are injurious to the trucks as well as to the cattle, and in both ways to the company's interests—and you will please let it be understood that any person sending away a cattle truck uncleaned will be liable to be brought before the directors.

Please acknowledge. Yours truly,
J. GRIERSON

(Circular No. 45.)

General Manager's Office,
Paddington, August 11th, 1865.

In consequence of the cattle plague having appeared in this country, the following regulations are to be strictly carried out throughout the line.

If any cattle are tendered for conveyance, and you have reason to suppose that any of them are infected with the cattle plague, you must decline to receive them, or permit them to come on the company's premises.

If cattle which have been diseased, or which you have reason to suppose are infected, are received at your station from any other station, the trucks in which they have been carried must immediately be thoroughly cleansed; and no such trucks are, under any circumstances, to be again used for the conveyance of cattle, or any description of traffic, until they have been cleaned with water, and afterwards disinfected with chloride of lime or such other disinfecting fluid as may hereafter be found the most efficient; and the trucks are not even then to be employed for any purpose until they have been repainted, if there is the slightest reason to fear that they still retain any trace of the disease so as to cause infection.

Any cattle that have been killed, or may be found dead in the trucks, in consequence of the disease, must be immediately buried in their hides at a depth of not less than five feet, and straw, manure, &c., taken out of any truck in which cattle supposed to be diseased have travelled, or which may be collected at any place where they have stood, must, in like manner, be buried; and, in both cases, quick lime is to be used before covering in.

Any person cleaning out the trucks, or in any way coming in contact with diseased cattle, must not again assist in the loading of cattle on the company's premises, or go near them elsewhere, until his clothes have been thoroughly disinfected, and sufficient time has elapsed to prevent the possibility of contagion; and no shovel, broom, or other article used in cleaning the trucks, &c., must be again used until proper steps have been taken, to the satisfaction of the company's or the public cattle inspector, to insure that there will be no risk of their communicating nfection.

If any diseased cattle are tendered for conveyance, or have been conveyed on the line, immediate notice must be given to the public cattle inspector, the chief constable or superintendent of police, and a full report must be sent to the district goods manager, and the company's cattle inspector.

For your information I annex a copy of an Order of the Privy Council on the subject, dated the 24th July.

Please acknowledge. J. Grierson,
General Manager.

P.S. The ordinary regulations as to the cleansing of cattle trucks must be strictly adhered to, in accordance with my previous circulars, and you must see that every cattle truck on arriving at your station is immediately cleaned out after the cattle are discharged; and any instance where empty cattle trucks are received at your station in a dirty state must be at once reported to the district goods manager, giving the name of the sending station.

[Here follows a copy of the Order in Council of the 24th July 1865.]

LANCASHIRE AND YORKSHIRE RAILWAY.

Prevention of Cattle Diseases.

General Order No. 307.

Traffic Manager's Office, Hunt's Bank,
Manchester, August 15th, 1865.

With a view as effectually as possible to prevent the extension of cattle diseases, the directors have ordered that each truck laden with cattle shall immediately, on its arrival at the station to which it is consigned, and on the cattle being taken out of it, be thoroughly swept and cleaned with a besom, and in all cases where it is possible, that it shall also be washed out with water.

It may hereafter be desirable to use a disinfecting fluid or powder, but on that subject you will, if necessary, have further instructions from me. The sweeping and washing out of the trucks will no doubt to a great extent accomplish the object which the directors have in view.

James Smithells.

Prevention of Cattle Diseases.

General Order No. 308. Traffic Manager's Office,
Manchester, August 24th, 1865.

Referring to my circular No. 307, of the 15th instant, I have to request that you will strictly carry out the following additional instructions on the subject:—

1. The regulations already issued as to sweeping and washing cattle trucks on arrival at a station, and after the cattle have been discharged, are to be adhered to, in accordance with my circular of the 15th instant.

2. Cattle pens and stages and water troughs are to be kept clean, and, when necessary, the disinfectant referred to in clause 3 is to be applied to the cattle pens and stages.

3. All cattle trucks, after they have been swept and well cleaned with water, must be washed with a solution of chloride of lime and of sulphuric acid and water, a supply of which articles will be sent to you on application to Mr. Badge, stores department, Miles Platting. About a quarter of a pound of chloride of lime should be mixed with a gallon of water, to which must be added half a pint of the sulphuric acid and water, which you will receive from the stores ready mixed. The mixture of chloride of lime and sulphuric acid should be put into a bucket and applied to the waggons with mops or brushes; the buckets, mops, or brushes so used must not be applied to any other purpose.

4. If any cattle are tendered for conveyance which you have reason to suppose are infected with the cattle plague, you must decline to receive them, or permit them to come upon the company's premises.

5. If cattle which have been diseased, or which you have reason to suppose are infected, are received at your station from any other station, the trucks in which they have been carried must be immediately swept out, and under no circumstances again used for the conveyance of cattle or any description of traffic until they have been washed with water, and afterwards so disinfected as to render their use perfectly safe

6. If any diseased cattle are tendered for conveyance, or have been conveyed on the line, or if any cattle have been killed, or may be found dead in trucks in consequence of the disease, immediate notice must be given to the public cattle inspector, the superintendent of police, or any other duly authorized public officer, and his instructions must be acted upon. A report of the case must at the same time be also sent to me.

7. Any person cleaning out the trucks, or in any way coming in contact with diseased cattle, must not again assist in loading cattle on the company's premises, or go near them elsewhere, until his clothes have been thoroughly disinfected, so as to prevent the possibility of contagion; and no shovel, broom, or other article used in cleaning the trucks, &c., must be again used until proper steps have been taken to satisfy the public cattle inspector that there will be no risk of their communicating infection.

James Smithells.

To Station Agents and others. Traffic Manager.

Prevention of Cattle Disease.

General Order No. 311.

Traffic Manager's Office, Hunt's Bank,
Manchester, September 27th, 1865.

Referring to General Order No. 308, it has been decided to discontinue the use of the sulphuric acid mixture, and only to use chloride of lime and water, which must be applied to cattle waggons in accordance with the instructions contained in my previous order above named. The other portions of the order must be adhered to until further notice.

James Smithells.

LONDON, BRIGHTON, AND SOUTH-COAST RAILWAY.

Important Circular to Superintendents, Station Masters, Goods Clerks, and all others concerned.

Cattle Plague.

Circular 294. 16th August.

I again have to call your attention to the disease now existing amongst cattle, and to request that you will carry out strictly the following instructions, in order that the extension of the disease may be prevented, so far as the conveyance of stock by this line is concerned:

1st. Any cattle presenting symptoms of infectious disease must not be received for conveyance upon this railway.

2nd. In the event of any diseased cattle being tendered for conveyance, full particulars must be sent to me, giving the names and addresses of the senders and consignees.

3rd. Should cattle which you have reason to suppose are infected be received at your station from any other station, the trucks in which they have been carried must not under any circumstances be again used for the conveyance of cattle until they have been thoroughly cleansed

with water, and afterwards disinfected with chloride of lime.

4th. All cattle-waggons must be scraped out and well washed down with water (under a water crane, if practicable), and then freely sprinkled with chloride of lime, *before being used again*, after each journey.

5th. When the waggons are not required for the conveyance of cattle, they must be worked to Deptford wharf, to be loaded with creosoted sleepers, as a good disinfectant.

6th. Any cattle that have been killed in your station, or may be found dead in the trucks, in consequence of the disease, must be immediately buried in their hides at a depth of not less than five feet, and straw, manure, &c. taken out of any truck in which cattle supposed to be diseased have travelled, or which may be collected at any place where they have stood, must, in like manner, be buried; and, in both cases, quicklime is to be used before covering in. Any person cleaning out the trucks, or in any way coming in contact with diseased cattle, must not again assist in the loading of cattle on the company's premises, or go near them elsewhere, until his clothes have been thoroughly disinfected, and sufficient time has elapsed to prevent the possibility of contagion; and no shovel, broom, or other article used in cleaning the trucks, &c., must be again used until proper steps have been taken to insure that there will be no risk of their communicating infection.

Chloride of lime will be supplied by the storekeeper.

The goods superintendent and his inspectors will take steps, in conjunction with the staff generally, to carry out these orders.

GEORGE HAWKINS,
Brighton Terminus, August 25, 1865. Traffic Manager.

CATTLE PLAGUE.

No. 294. Brighton Terminus, August 16th, 1865.

BELOW I hand you copy of a communication from the Privy Council, and have to request your most particular attention to this important matter:—

"The Clerk of the Council to the Secretary of the Board of Trade.

"Privy Council Office, Whitehall, 5th August 1865.

"SIR,—I am directed by the Lord President of the Council to request that you will have the goodness to move the Lords of the Committee of Council for Trade to communicate with the various railway boards throughout the United Kingdom, as regards the means that may be adopted by them to prevent the increase of the cattle plague, which has lately appeared in this country, and which threatens to be of a most formidable character.

"There is no doubt that the extension of this disease will be greatly aggravated by the traffic on railways, if the utmost attention is not paid to the cleansing and disinfecting of all trucks, cattle sheds at the stations, and all places where cattle are either put upon railways or taken from them.

"The Lord President is anxious that no time should be lost in giving this information to railway boards, and that the Lords of the Committee of Council for Trade should urge upon the directors of the various companies, as a public duty, to take immediate steps for instructing their officers to see that stringent regulations are made and enforced to ensure that cleanliness in all matters connected with the conveyance of cattle which is at the present moment imperatively required.

"I am, Sir,
"The Secretary, Your obedient servant,
"Board of Trade. (Signed) ARTHUR HELPS."

GEO. HAWKINS, Traffic Manager.

SPECIAL NOTICE to all Parties concerned.

DISEASED CATTLE.

THE London, Brighton, and South-Coast Railway hereby give notice that they will not convey cattle suffering from disease, and more particularly if affected by any contagious or infectious disorder, such as is generally called the "Cattle Plague," which may be recognized by the following symptoms.

[Here follows the description of the symptoms of the disease given in the Order of Council of the 11th August 1865.]

The company's servants are instructed not to receive for conveyance any cattle believed on good and sufficient grounds to be so affected, and should any such be tendered or unwittingly conveyed, they are to report to the traffic manager the names and addresses of the senders and consignees of them.

GEO. HAWKINS,
Brighton Terminus, August 25th, 1865. Traffic Manager.

LONDON, CHATHAM, AND DOVER RAILWAY.

Circular No. 92. B.

Goods Manager's Office, Victoria Station,
DEAR SIR, Pimlico, S.W., August 10th, 1865.

THE cattle plague having visited this country with most serious consequences, the regulations following must be rigidly adhered to.

1. Cattle suspected to be infected with the plague may not be received for conveyance by this railway, and every effort must be made to keep them away from the company's premises.

2. If you should have reason to suppose that any cattle, suffering from the disease, have been carried over the line you will, immediately upon the arrival of the train at your station, cause them to be forthwith removed from the limits of your station and at once have the trucks, in which they were conveyed, cleansed with water, and afterwards purified with chloride of lime, or other disinfectant.

3. No truck, having carried diseased stock, may be used for any purpose until it has been thoroughly cleansed and disinfected.

4. Should any diseased stock arrive at your station, dead; or should it be necessary to slaughter any animal affected, you must take immediate measures to effect the burial of carcase and hide to the depth of five feet in the ground.

5. All straw, manure, &c. found in the same truck must be buried (first strewing all with quick lime), or must be consumed by fire.

6. No person who may, in the process of discharging stock, come in contact with a diseased animal must be allowed to assist in loading or unloading cattle on your premises, until you are thoroughly satisfied that his clothes have been disinfected, and that no fear of contagion will arise.

7. Any article used in cleaning out the condemned trucks must pass through the cleansing and disinfecting ordeal.

8. You will be good enough, immediately upon discovery of the disorder, to place yourself in communication with this office, and I rely upon your best exertions not only to see that these instructions are fulfilled, but that all other precautionary measures are adopted to prevent the spread of the disease.

I am,
Yours truly,
Mr._____ C. H. CHAPMAN,
_____Station. Goods Manager.

Circular No. 99. B.

Victoria Station, Goods Manager's Office,
DEAR SIR, Pimlico, S.W., September 1st, 1865.

THE following having become orders of Her Majesty's Privy Council, I have to direct your special attention to my circular No. 92 B, 10th August, and to request that every measure be adopted to exclude from the company's premises all stock which you have reason to believe may be suffering from the cattle disease.

"That it shall not be lawful to send or to bring to any "fair or market, or to send or carry by any railway, or by "any ship or vessel coastwise, or to place upon, or to "drive along any highway or the sides thereof, any animal "labouring under such (contagious or infectious) disease.

And "every person offending against the order shall, for "every such offence, forfeit any sum, not exceeding twenty "pounds, which the justices before whom he or she shall be "convicted of such offence may think fit to impose."

Yours truly,
Mr._____ C. H. CHAPMAN,
_____Station. Goods Manager.

LONDON AND NORTH-WESTERN RAILWAY.

Circular No. 549.

General Manager's Office, Euston Station,
London, N.W., August 14th, 1865.

TO STATION AGENTS.—CLEANSING OF CATTLE WAGGONS.

THE attention of the Directors has been called to the disease existing amongst cattle at the present time, and with a view of preventing its extension, so far as the car-

riage of cattle by this railway is concerned, they direct as follows until further notice:—

1. That no cattle presenting any symptoms of infectious disease be received for carriage at any of the stations.
2. That the cattle waggons be thoroughly cleaned immediately after each journey, and that Mr. Salmon, the cattle manager, take steps, in conjunction with the district superintendents and goods managers, to carry out this regulation.
3. That chloride of lime, whitewash, or other disinfectants be used in the cleaning of the waggons.

W. Cawkwell.

Circular No. 551.—Cattle Plague.

The attention of the cattle traffic superintendent, the goods managers, agents, and others concerned, is especially directed to the subjoined extracts from two important Orders in Council, promulgated on the 25th August.

Under one of these orders the removal of any cattle from any port in Great Britain to any port in Ireland is prohibited, under a penalty of 20*l.* for each offence; and, under the latter, it is declared unlawful, under a similar penalty, to carry by railway any animal labouring under the disease known as the cattle plague.

All the officers concerned are enjoined to give proper directions, and use their most strenuous efforts to ensure compliance with the requirements of the Government orders contained in these extracts.

W. Cawkwell,
General Manager.

General Manager's Office,
Euston Square, London, N.W.,
28th August, 1865.

Extracts from Orders in Council,
Bearing date 25th August.

"That in this order the word 'cattle' shall be interpreted to mean any cow, heifer, bull, bullock, ox, or calf.

"That after the date of the publication of this order in the *London Gazette*, it shall not be lawful for any person to remove any cattle from any port or place within that part of the United Kingdom called Great Britain to any port or place within that part of the United Kingdom called Ireland.

"That it shall not be lawful to send or bring to any fair or market, or send or carry by any railway, or by any ship or vessel coastwise, or to place upon, or to drive along any highway, or the sides thereof, any animal labouring under such disease."

Circular No. 552.—Cattle Plague.

In the event of infected cattle reaching any of the Company's stations from stations on the London and North-western line, or from foreign companies' lines, the agents must lose no time in communicating, where possible, with the municipal authorities of the place, in order that the cattle may be subjected to the inspection of the proper officer.

In case the municipal authorities decline to act, or no local authorities can be found to act, the agent is authorized to employ a veterinary surgeon to inspect the suspected animals; and in the event of his report confirming the suspicions of the agent, the agent is to lose no time in having the infected animals killed and buried, and the trucks purified and cleansed in terms of the order contained in Circular No. 549a.

Cattle proved to be infected arriving at London and North-western stations must, on no account, be returned along the railway to the sending station. Such cattle must be destroyed, under the orders, either of the municipal authorities, of the veterinary surgeon employed by the Company's agent, or, in case of emergency, of the agent himself.

Great care must be taken that all cleaning materials used in sweeping or cleansing cattle waggons or pens which have been occupied by diseased cattle should not be again used until they have been subjected to a disinfecting process. The same observation applies to the clothes worn by porters and loaders who have come in contact with infected cattle, or the trucks in which infected cattle have travelled.

W. Cawkwell,
General Manager.

General Manager's Office,
Euston Station, London, N.W.,
26th August, 1865.

No. 563.—Cattle Murrain.

Referring to my Circulars 551, 555, 559, 561, the Company's officers concerned are again reminded of the urgent necessity for the strictest attention being paid to the directions therein contained, as to the cleansing and purification of cattle waggons, pens, and sheds which may have been occupied by cattle.

Any instance of neglect of these instructions will be visited with the severe displeasure of the Directors.

By order,
W. Cawkwell,
General Manager.

General Manager's Office,
Euston Station,
January 4th, 1866.

No. 568.—Cattle Plague.

With reference to Circulars 551, 555, 559, 561, and 563, it is again reported to the Directors that proper attention is not paid to the cleansing and disinfecting of cattle waggons after discharge of the load.

Agents and others concerned are again informed that this precaution is of primary importance and must not be neglected, under pain of the severe displeasure of the Directors.

The manure removed from the trucks must be placed in detached heaps or pits, and disinfected by lime. On no account must it be sold or dispersed before it is disinfected.

By order,
W. Cawkwell,
General Manager.

General Manager's Office,
Euston Station,
16th January, 1866.

LONDON AND SOUTH-WESTERN RAILWAY.

Circular to the Station Agents.

Goods Manager's Office, Nine Elms Station,
London, 10th August 1865.

Some apprehension is felt concerning the spreading of the contagion said to exist amongst cattle by loading them in trucks that may have carried cattle affected by the disease now prevailing.

It is necessary, therefore, that we should take steps to relieve the mind of the public with regard to this matter, and you will give instructions, therefore, that every cattle waggon, or waggon that may have contained cattle or sheep, on arrival at your station shall be thoroughly swept and cleaned, and sprinkled with chloride of lime as a disinfectant.

The chloride of lime can be obtained on application to the stores department.

You must, yourself, see that these instructions are carried out, and I trust that you will give the matter your personal attention.

James Haddow,
Goods Manager.

Cattle Disease.

Circular to Station Agents.

Goods Manager's Office, Nine Elms Station,
18th August 1865.

I have to call attention to my circular of the 10th inst., with regard to the cleansing of cattle trucks, and I hope the agents are giving the subject their personal attention.

An instance has occurred within the last few days of five cows, affected with the disease now prevailing, having been delivered at a station on this line, and consigned to London.

To prevent spreading of the contagion, it is absolutely necessary that steps should be taken to stop, as far as possible, infected cattle being carried by railway, and the agents should endeavour when cattle (particularly cows) are tendered for conveyance, to ascertain whether the animals are affected by the disease or not, and the agents are instructed that if, in any instance, they find that cattle so tendered are affected, they are to decline to receive the cattle for conveyance over this railway.

Notice of all such cases must be given to me,
James Haddow,
Goods Manager.

Special Notice to all Parties concerned.—Diseased Cattle.

The London and South-western Railway Company hereby give notice that they will not receive for conveyance, or convey, cattle suffering from disease, and more particularly if affected by any contagious or infectious disorder, such as

is generally designated as the "Cattle Plague," which may be recognized by the following symptoms:—

[Here follows the description of the symptoms of the disease given in the Order in Council of the 11th August 1865.]

The station agents are instructed not to receive for conveyance any cattle believed on good and sufficient grounds to be so affected. They must immediately report to the traffic manager when cattle are refused to be received, or when cattle suffering under disease are unwittingly conveyed, in each case giving full particulars and names and addresses of consignors and consignees.

By order,

Waterloo Station, FREDERICK CLARKE,
London, 21st August 1865. Secretary.

SPECIAL NOTICE to all Parties concerned.—DISEASED CATTLE.

[Here follows a repetition of the Railway Company's "Special Notice" of the 21st August, which is given above.]

Penalty.

By an Order in Council, dated the 26th August 1865, it is ordered—That it shall not be lawful to send or bring to any fair or market, or to send or carry by any railway, or by any ship or vessel coastwise, or to place upon, or to drive along any highway or the sides thereof, any animal labouring under such disease.

Every person offending against this order shall for every such offence forfeit any sum, not exceeding twenty pounds, which the justices before whom he or she shall be convicted of such offence may think fit to impose.

By order,

Waterloo Station, FREDERICK CLARKE,
London, 28th August 1865. Secretary.

MANCHESTER, SHEFFIELD, AND LINCOLNSHIRE RAILWAY.

(General Order, No. 35.)

General Manager's Office,
Manchester, August 16th, 1865.

I HAVE to direct the special attention of clerks in charge and the staff generally, to the annexed copies of circular letters, received from the Lord President of the Privy Council, and from the Committee of the National Association for the Prevention of Cattle Diseases, on the subject of the rapid extension of the cattle plague.

As the disease is infectious, and appears to be readily communicated to healthy animals, it is of the utmost importance that, as cattle trucks may have conveyed diseased cattle, every truck be thoroughly washed and cleansed immediately on being unloaded, and before it is again used. Cattle pens and all other places used in any way for cattle must also be kept thoroughly and perfectly clean.

Every effort must be used by station masters and the staff to prevent the extension of the disease. Rule 228 of "General Instructions" must be carefully carried out, and in addition to the thorough washing and cleansing, lime wash and a disinfectant (a supply of which may be had on application to the storekeeper) must be freely used.

Acknowledge receipt.

R. G. UNDERDOWN,
General Manager.

Mr. _____

_____ Station.

[Here follow the letter from the Clerk of the Council to the Secretary of the Board of Trade, which will be found at p. 59; and the letter from the Secretary of the National Association for the Prevention of Cattle Diseases, which will be found at p. 57.]

General Manager's Office,
Manchester, Sept. 8th, 1865.

(General Order No. 36.)

CATTLE PLAGUE.

REFERRING to my General Order No. 35, August 16th, I have to further direct the serious attention of the clerks in charge and the staff generally, to the following extract from the communication received from the Lords of the Privy Council:—

"8. That it shall not be lawful to send or bring to any fair or market, or to send or carry by any railway, or by any ship or vessel coastwise, or to place upon or to drive along any highway or on the sides thereof, any animal labouring under such disease.

"9. Every person offending against this order, shall for every such offence forfeit any sum not exceeding twenty pounds, which the justices before whom he or she shall be convicted of such offence, may think fit to impose."

The staff are therefore requested to prevent any cattle which there is reason to believe to be suffering from such disease, from coming on to the Company's premises; and should such be offered for conveyance, or received loaded at any station, dead or alive, information must at once be given to the public cattle inspector, superintendent of police, or other duly authorized public officer, and his instructions carried out, and a report of the circumstance at once forwarded to me.

Any person cleaning out trucks which have conveyed diseased cattle, or in any way coming in contact with cattle so affected, must not again assist in loading or unloading trucks until his clothes have been thoroughly disinfected, so as to prevent the possibility of contagion; and no shovel, broom, or other article used in cleansing the trucks, &c., must be again used until proper steps have been taken to satisfy the public cattle inspector that there will be no risk in their communicating the infection.

All the persons in the employ of this Company are again strictly enjoined to use every possible effort to prevent the extension of this serious plague; and I cannot too strongly urge the importance of strictly carrying out the regulations issued on the subject.

R. G. UNDERDOWN,
General Manager.

Mr. _____

_____ Station.

MIDLAND RAILWAY.

Goods Manager's Office,
Derby, 15th August, 1865.

DEAR SIR,

IN consequence of the rapid spread of the cattle disease in this country the company have been requested to adopt such measures as may be necessary, as far as they are concerned, to cleanse the cattle waggons running on this railway. With this view I am instructed to request that you will, on receipt hereof, cause every cattle waggon arriving at your station, loaded, to be well washed, when unloaded, and then to be further washed with lime water, the proportions of lime and water to be about the same as used for whitewashing. You may, if possible, get the lime at your station or in the neighbourhood, and send us the bill for what you have used at the close of each month, until you receive further instructions.

Yours truly,
THOS. WALKLATE,
per E. C. HEWES.

Goods Manager's Office,
Derby, Oct. 7th 1865.

DEAR SIR,

IN reference to our circular of the 17th August, instructing you to have all cattle waggons cleansed when unloaded, please note that the instructions will also apply to sheep vans or cattle waggons loaded with sheep.

Acknowledge receipt.

Yours truly,
THOS. WALKLATE,
per W. FEAST.

MIDLAND GREAT WESTERN (OF IRELAND) RAILWAY.

Circular.) Manager's Office, Broadstone, Dublin,
SIR, 28th August 1865.

YOUR attention has, doubtless, been called by the newspapers to the Cattle Plague now prevailing in England. Happily it has not yet appeared in Ireland; but the directors are desirous to adopt every known means to prevent the infection of cattle entrusted to the company for conveyance over their lines, and I therefore request your particular attention to the following precautions:—

1. All waggons and trucks used for conveying cattle are to be thoroughly washed after each journey, and sprinkled with peat charcoal.

2. Platforms, pens, and other premises used by cattle, are to be cleansed after the removal of every lot of cattle.

You are charged to explain these regulations to your staff, and see them strictly carried out.

Acknowledge receipt.

Yours truly,
W. G. SKIPWORTH.

Mr. _____

_____ Station.

NORTH BRITISH RAILWAY COMPANY.

Cattle Plague.

General Order $\frac{5}{65}$. General Manager's Office,
Edinburgh, 12th August 1865.

To Station Agents and Others.—Immediate and Important.

Every cattle truck received at a station loaded with cattle must, so soon as the stock has been discharged, be immediately cleaned, and if possible washed, in the most thorough manner the means of the station agent will admit of.

Implicit compliance with this order is most important.

Cattle Plague.

General Order No. $\frac{7}{65}$. General Manager's Office,
Edinburgh, 22nd August 1865.

To Station Agents and all concerned.—Immediate and Important.

The storekeeper has instructions to provide every station agent with a supply of lime shells.

Every cattle truck received at a station loaded with cattle must, so soon as the stock has been discharged, be immediately washed with fresh water thickened with the shells of lime and used while warm.

The quantity of lime water to be made at a time should not be large, but should be just as much as will meet the necessities of the moment.

Implicit compliance with this order is most important.

Thos. K. Rowbotham,
General Manager.

Cattle Plague.

General Order No. $\frac{9}{65}$. General Manager's Office,
Edinburgh, 22nd September 1865.

The directors have rescinded the order dated 22nd August with reference to the above.

The washing of cattle trucks with lime water must accordingly be discontinued, but agents must continue to see that the trucks are scraped and cleaned in a thorough manner, and, after which, that they are washed with hot water at such stations where it can be procured.

At those stations where there are no means of procuring hot water, the trucks must be thoroughly washed with cold water.

Cattle Plague.

General Order No. $\frac{17}{65}$. General Manager's Office,
Edinburgh, December 1865.

[Here follows a copy of the Railway Company's "General Order" of the 22nd September, which is given above.]

The attention of station agents is again directed to the order dated 22nd September 1865, of which the above is a copy, and to the absolute necessity for a strict compliance with it.

The station agent at each station will be held responsible for the immediate cleaning of any trucks arriving at his station with cattle, so that they may be in a condition for use before they can be possibly required again. The carrying out of this instruction is therefore a matter which cannot be delayed any time whatever.

The cattle pens and cattle banks at each station must also be cleaned instantly after use.

Should it appear that the company have carried any cattle diseased, or supposed to be diseased, the instructions given as to cleaning of trucks, pens, and cattle banks must, if it were possible, be attended to more strictly.

Thos. K. Rowbotham,
General Manager.

NORTH-EASTERN RAILWAY.

Cattle Waggons.

Goods Manager's Office, 23rd August 1865.

In order to prevent, as far as possible, the extension of the existing cattle disease, it has been arranged that all cattle waggons standing at shall be carefully swept out and disinfected by means of chloride of lime.

The pens and loading places must also be kept perfectly clean, and must from time to time be sprinkled with the solution of chloride of lime.

The water troughs, if you have any, must be kept as clean as possible.

Mr. Barnes will supply you with—

Shovel,
Sweeping brush, } for cleansing the waggons.
Galvanised iron bucket, in which to dissolve the chloride of lime.
Cask of chloride of lime.
Whiting brush, with which to apply the solution.

If you require a larger supply, or when any of the articles supplied require renewing, send in a requisition to Mr. Barnes in the ordinary course.

The waggons must be carefully swept out, special care being taken that the corners be thoroughly cleared of manure, &c.

The chloride of lime must be dissolved in the proportion of about 1 lb. in a gallon of water, which will be about the quantity required for each waggon. The liquid must be applied to the whole of the inside of the waggons, including the top rails and the floors.

Should there be reason to suppose that any waggon has carried cattle suffering from the cattle plague, such waggon must be thoroughly washed with water, and treated with a much stronger solution of chloride of lime before it is again used for the conveyance of cattle.

The chloride of lime must be kept in a dry place, and must be obtained from Mr. Barnes in small quantities, as it becomes less effective if kept long, or exposed to damp.

(Signed) J. Wilson,
Goods Manager.

To Station Masters, Goods Agents, &c.

Circular. General Manager's Office.
York, 1st September 1865.

Considerable alarm has very naturally been excited by the appearance in this country of a disease amongst cattle, known as the "Rinderpest" or "Cattle Plague."

With the view of preventing its spread as much as possible, instructions have been issued by Her Majesty's Privy Council, from which the following are extracted.

[Here follow extracts from the Order in Council of 11th August 1865.]

You will see from the above extracts that the inspectors appointed by the magistrates have full power to enter upon the company's premises, and to give instructions as to the disposal of any diseased cattle which they find there.

These instructions must at all times be implicitly obeyed, and you must also do everything in your power to assist the inspectors in performing their duties.

Should any cattle which you have good reason to believe are suffering from the disease be tendered to you for conveyance by rail, you must refuse to receive them, immediately acquainting the nearest police officer or magistrate with the circumstances. You will also telegraph at once what you have done to the goods manager of the district, and also report to him fully in writing.

Instructions have already been given to the agents at all the larger stations to sweep out and disinfect all cattle waggons when standing at those stations.

The following officers have been appointed to see that these instructions are properly attended to—

Mr. Benson, York for the Southern Division.
Mr. Henderson, Berwick „ Northern Division.
Mr. Josh. Parker, Newcastle „ Carlisle Section.

Should the agent at any of the stations which have not been supplied with chloride of lime, &c., for disinfecting the waggons, receive for the conveyance of cattle a waggon which has not been properly cleaned out, he must ascertain from the guard of the train from what station it was sent, and report to Mr. Benson, Mr. Henderson, or Mr. Parker, as the case may be.

He must also see that before the waggon is loaded it is properly swept out, and that a few handfuls of quick-lime are sprinkled over the floor of the waggon.

All cases of the existence of the disease in your neighbourhood, with the best information you can obtain as to the circumstances, must be at once communicated to one of the three officers named above.

When the ordinary staff at any station is insufficient to carry out the instructions as to the cleansing of waggons, additional men may be employed, and the amounts paid to them may be entered in the goods pay bill.

W. O'Brien.

NORTH STAFFORDSHIRE RAILWAY.

Cattle Plague.

Goods Manager's Office.

Dear Sir, Stoke-upon-Trent, 10th August 1865.

I am instructed to call your attention to the serious distemper which at this time is so prevalent amongst cattle, and to impress upon you (in order, if possible, to prevent the spread of it by railway), the important necessity of paying particular attention to the cleanliness of the cattle pens and cattle trucks at your station.

To effect this object, you must see that every truck is well scraped and washed out previous to loading cattle

in it, and, if necessary, that some disinfectant be mixed with the water used for washing the trucks.

No. 1. As a disinfectant you may use quick-lime mixed with water, until about the consistency of whitewash, and to be used with a brush in like manner.

No. 2. Or, one part by weight of quick-lime and two parts by weight of soda crystals (the common washing soda), also made into a kind of whitewash. This must be used with care, for it is very caustic, and will destroy all paint, &c.

No. 3. Or, one pound of chloride of lime dissolved in about one gallon of water.

It will be advisable, in cleaning the cattle trucks, 1st, to scrape them well; 2ndly, to wash them with solutions, either No. 1 or 2. Afterwards allow them to stand for a short time, and then wash them well out with water, and lastly give them a good sprinkling with the solution of chloride of lime, No. 3.

With respect to the cattle pens, they must be, if necessary, scraped out daily, the floor well dusted with quick-lime, and the timber work well washed with quick-lime, whitewash (No. 1), or solution of chloride of lime, No. 3.

If any cattle are brought to your station to be forwarded by rails, which you know are diseased, you must refuse to receive them. Also, if you have any reason to suspect that they are diseased, you will refuse to receive them, unless the owner produces a certificate as to their healthiness from a veterinary surgeon.

You will be supplied by the stores department with the soda and chloride of lime. Should you have any difficulty in getting quick-lime, let me know.

You will report to this office any cases which may come to your knowledge of diseased cattle having been carried over this railway.

Send by first train all the empty N. S. cattle waggons, which you may from time to time have on hand, to station. A staff is there employed to clean them.

Acknowledge receipt.

Yours truly,
JAMES CORDON.

Mr._____.
_____Station.

SCOTTISH NORTH-EASTERN RAILWAY.

IN order to the prevention of the spread of the existing cattle plague, the directors have resolved that, for a time, every cattle truck must be properly cleaned, washed, and then whitewashed with lime before being used for the conveyance of cattle.

A small quanity of lime will be sent you, and about four lbs. of it should be dissolved in a pailful of water, and spread around the inside of the truck with a mop—after all the filth has been removed by scraping and washing.

General Manager's Office,
Aberdeen, 17th August 1865.

CATTLE PLAGUE.

THE attention of station agents is called to the following Order from the Board of Trade regarding the cattle disease, viz.:—"That it shall not be lawful to send "or bring to any fair or market, or to send or carry by "any railway, or by any ship or vessel coastwise, or to "place upon, or drive along, any highway, or the sides "thereof, any animal labouring under such disease." The word "animal" means any cow, heifer, bull, bullock, ox, or calf.

The company must respect the above Order, and you must refuse to permit any such diseased animal being put into any truck, or to lodge anywhere on or about the company's premises.

You must send notice to the inspector of the district immediately on the arrival of any cattle by railway, so that he may have an opportunity of examining the animals before being removed from the station; and if any are diseased, inform the goods manager.

Acknowledge receipt.

WM. ESPLIN,
General Manager's Office, General Manager.
Aberdeen, 4th September 1865.

CATTLE PLAGUE.

IN compliance with a recommendation of the justices of peace in our district, the company will not, until further orders, receive any cattle for carriage on the railway, without a certificate from a district inspector that the same are free from disease.

Acknowledge receipt.

WM. ESPLIN.
General Manager's Office, General Manager.
Aberdeen, 21st October 1865.

SOUTH DEVON RAILWAY.

TELEGRAM sent from the Secretary to all South Devon Stations on the 9th August 1865.

All cattle trucks must be immediately washed out; later, a disinfecting fluid will be sent you.

CATTLE TRUCKS.

9th August 1865.

As soon as you have thoroughly washed out these trucks, the disinfecting fluid, which will be sent you, must be well sprinkled over the trucks, and the bars and sides thereof well rubbed.

Yours truly,
W. H. AVERY.

CATTLE TRUCKS.

21st August 1865.

PLEASE continue to thoroughly cleanse all cattle trucks and use the disinfectant until further notice.

Yours truly,
W. H. AVERY.

CONVEYANCE OF CATTLE.

Plymouth, 18th November 1865.

IN consequence of the cattle disease, which has appeared in several parts of the country, you must, from and after this date, before receiving any cattle for conveyance by railway, obtain a certificate from the consignor declaring that the animals are entirely free from disease, and which declaration please pin to the consignment note. You must not receive any animals for transit that are suffering from disease.

Yours truly,
W. H. AVERY.

Secretary's Office, Plymouth,
DEAR SIR, 1st January 1866.

YOU are requested to ascertain and inform me, whether the local authorities have prohibited traffic in cattle or skins, hides, horses, &c., in the division in which your station is situated.

If such orders have been issued, you must not receive cattle, skins, &c., for conveyance, nor allow such traffic to be unloaded at your stations, until further notice.

L. J. SEARGEANT,
Secretary.

SOUTH-EASTERN RAILWAY.

(Circular.) General Manager's Office,
SIR, August 1865.

WITH the view of preventing, as far as we are able, the spread of the Cattle Plague which has recently appeared in this country, and which threatens to be of a formidable character, I have to call the particular attention of station masters to Rule 497, page 200, of the rules and regulations of 26th November, 1857, and especially relative to the cleansing of all cattle wagons so that "the slides and "rebates of the doorways shall be carefully kept free from "dirt, and the floors of sheep and cattle wagons cleansed "after every journey when carrying sheep or other cattle. "The water-holes in the bottom of trucks and wagons "must also be carefully kept open by probing." It is hoped by adoption of measures of this description to protect clean stock against contamination during transit over the railway in vehicles in which, by chance, diseased cattle may have been previously conveyed.

It will be necessary, in addition to the ordinary cleaning, that every wagon arriving with cattle be well drenched out with lime-water immediately after being unloaded, at least half-a-dozen buckets-full of water being used for the purpose; similar attention being required in cleansing the Company's cattle and sheep pens.

I have only to add that, bearing in mind the object of these arrangements, I rely upon your cordial co-operation in carrying them out.

I am, Sir,
Your obedient servant,
C. W. EBORALL,
General Manager.

APPENDIX D.

RETURNS furnished by W. CAWKWELL, Esq., respecting CATTLE and DEAD-MEAT TRAFFIC on the NORTH-WESTERN and other Railways.

1. STATEMENT of Dead-Meat Traffic.

Received at London and North-western Railway, Camden, for month of September 1865.

SCOTCH.	Tons	Cwts.	LOCAL.	Tons	Cwts.
Aberdeen	85	10	Aylesbury	8	7
Arbroath	4	15	Ampthill	7	0
Alnes	0	2	Atherstone	9	2
Brechin	2	9	Bedford	1	14
Carlisle	13	19	Brockley	1	8
Dundee	1	0	Banbury	4	4
Edinburgh	10	18	Bedworth	4	17
Ellon	0	15	Brixworth	0	3
Elgin	5	8	Blisworth	1	12
Fochabers	4	19	Buckingham	1	10
Forres	3	17	Coventry	1	17
Fraserburgh	0	4	Crick	1	16
Farnel Road	0	3	Dunstable	4	10
Forfar	36	5	Elmsthorpe	2	3
Glasgow C. R.	58	7	Hinckley	4	19
Glanris	0	3	Higham	3	15
Huntley	4	3	Leighton	10	13
Invergordon	1	7	Leicester	80	3
Kerrimur	0	11	Market Harborough	0	8
Keith	2	19	Meadbourne	1	17
Larbest	5	6	Nuneaton	1	0
Macduff	0	4	Northampton	28	1
Montrose	1	0	Oundle	1	12
Peterhead	48	8	Oxford	2	6
Perth	7	17	Peterborough	8	7
Stonehaven	2	19	Potton	1	4
Burghead	2	11	Rugby	2	19
			Rockingham	2	9
			Roade	0	3
			Seaton	1	6
			Stamford	5	8
			Thrapstone	3	12
			Tring	4	0
			Wolverhampton	0	15
			Welford	2	10
			Weedon	0	10
			Wolverton	0	12
			Winslow	5	1
			Wellingborough	2	7
			Woburn	1	15
			Lichfield	1	7
	305	19		229	2

GROSS TOTAL:—	Tons	Cwts.
(Belfast) Irish meat	2	6
Scotch meat	305	19
Local meat	229	2
	537	7

SUMMARY.

	Tons.
Four months traffic, on the basis of the traffic for September, which may be taken as an average summer month	2,100
Eight months at 50 per cent. increase upon the summer months	6,300
ANNUAL TOTAL	8,400

2. STATEMENT of Live Stock conveyed to London by the following Railway Companies during the Year ending 30th June 1865.

Company.	Cattle.	Calves.	Sheep.	Pigs.	Total.
Great Eastern	100,864*	—	401,553	40,058	542,475
London and North-western	57,121	4,014	182,883	17,622	261,640
Great Northern	28,311	715	164,103	4,268	197,397
Great Western	11,296	10,496	144,556	1,186	167,534
London and South-western	6,312	3,567	94,435	1,586	105,900
Midland	26,326	609	51,141	561	78,637
London, Chatham, and Dover	15,705	45,728†	—	906	62,339
London and Brighton	1,038	311	9,365	561	11,275
South-eastern	616	212	34,911	982	36,721
Totals	247,589	65,652	1,082,947	67,730	1,463,918

* Including Calves. † Including Sheep.

3. STATEMENT of Cattle Traffic received at and forwarded from the under-mentioned Stations, 12 months ending 31st August 1865.

Stations.	Horses.	Cattle.	Calves.	Pigs.	Sheep.
Dublin:					
Received at					
Forwarded from	865	47,432	60	84,296	69,323
Liverpool:					
Received at	119	12,234	10,141	5,961	195,515
Forwarded from	3,528	66,605	695	107,383	147,964
Manchester:					
Received at	307	58,711	14,813	65,987	242,841
Forwarded from	101	11,269	168	3 660	51,282
Leeds:					
Received at	78	2,968	286	6,754	326
Forwarded from	27	1 371	27	10,138	10,085
Carlisle					
Received at	74	22,403	2,668	1,844	6,627
Forwarded from	232	7,666	82	2,464	46,690
Wolverhampton:					
Received at	1,978	11,246	5,315	53,399	48.732
Forwarded from	22	2,810	150	10,141	12,482
Birmingham:					
Received at	149	16,087	1,965	70,278	70,033
Forwarded from	1,322	1,247	737	8,755	5,433
Shrewsbury:					
Received at	139	4,070	280	7,269	19,572
Forwarded from	220	6,488	205	10,512	15,535
Totals	9,161	272,607	37,592	449,341	942,440

4. STATEMENT showing the Quantity of Cattle received at London and North-western Stations from Scotland, during 12 months ending 31st August 1865.

Station Received at.	Cattle.	
	Fat.	Lean.
Bay Horse	—	291
Birmingham	47	—
Blisworth	—	10
Bletchley	—	10
Carlisle	7,371	3,000
Carnforth	—	28
Chester	71	—
Crewe	—	211
Hartford	—	80
Harrow	—	8
Hereford	—	13
Ingleton	36	36
Kendal	8	—
Kirkby Lonsdale	140	70
Lancaster	550	248
Liverpool	2,737	—
London	5,548	—
Leominster	—	151
Leighton	—	93
Manchester	832	—
Market Harborough	—	16
Milnethorpe	—	69
Oxenholme	12	—
Penrith	375	—
Peterborough	—	60
Preston	2,200	1,107
Parkside	—	21
Shrewsbury	—	122
Stafford	—	107
Stamford	—	101
Tamworth	—	16
Tebay	157	—
Warrington	—	479
Watford	—	2,047
Welford	—	21
Welshpool	—	17
Whitmore	45	—
Whitchurch	—	24
Windermere	8	—
Wigan	122	—
Wolverhampton	10	—
Weedon	8	—
Abergele	—	73
	20,277	8,529

5. STATEMENT of Cattle received at London and North-western Stations from Wales, for 12 months ending 31st August 1865.

Received at	Cattle.	
	Fat.	Lean.
Banbury	35	35
Bletchley	53	120
Birmingham	379	—
Boxmoor	—	109
Chelford	—	32
Chester	800	2,007
Crick	228	1,000
Crewe	400	162
Coventry	—	248
Cambridge	—	84
Congleton	300	56
Derby	22	—
Hanwood	—	575
Hereford	—	124
Huddersfield	128	128
Kendal	—	15
Leicester	772	771
Leighton	—	34
Leominster	—	39
Leamington	73	73
Leeds	68	69
Liverpool	1,500	93
London	1,279	—
Manchester	1,621	—
Market Harborough	—	1,203
Macclesfield	59	59
Northampton	—	1,391
Nuneaton	—	2,679
Peterborough	—	193
Rugby	—	3,711
Rugeley	—	183
Shrewsbury	1,245	1,245
Slaithwaite	271	1,000
Stafford	60	207
Stockport	100	36
Stoke	400	54
Tamworth	50	863
Uttoxeter	100	68
Warrington	60	204
Watford	—	3,604
Weedon	—	318
Welford	—	327
Wellingborough	—	322
Whaley Bridge	—	292
Wigan	103	—
Wolverhampton	797	—
Wolverton	69	69
Yockleton	—	138
	10,972	23,940

6. STATEMENT showing the Quantity of Cattle booked through, on the North-western Railway, from Irish Ports to places in England, viâ Liverpool and London and North-western route, during 12 months ending 31st August 1865.

To	Cattle.	
	Fat.	Lean.
Leeds	58	58
York	—	903
Darlington	—	17
Hartley	—	46
Cambridge	—	727
Carlisle	—	173
London	1,605	—
Wakefield	10	—
Wolverhampton	102	—
Huntingdon	—	1,257
Manchester	2,645	—
Skipton	—	22
Huddersfield	—	14
Doncaster	—	28
Lincoln	—	137
Leicester	—	49
Brigg	—	24
Buxton	—	18
Bradford	16	—
Preston	31	31
Uttoxeter	34	34
Hartford	—	10
Shrewsbury and Hereford Stations	—	35
Stafford	—	3
Whitmore	10	—
Lancaster	102	—
Marsborough	55	—
	4,488	3,586

7. STATEMENT showing the Quantity of Cattle forwarded from Liverpool, during 12 months ending 31st August 1865.

To	Cattle.	
	Fat.	Lean.
Birmingham	5,140	—
Bescot	840	—
Bolton	380	579
Chester	—	—
Huddersfield	3,834	17
Lancaster	—	—
Leeds	438	—
Leigh	282	153
Leominster	—	—
London	276	167
Longwood	—	98
Mirfields	—	—
Manchester	32,487	109
Market Harborough	—	—
Stockport	16	437
Warrington	—	—
Wigan	670	62
Winsford	—	—
Wolverhampton	3,769	—
Wakefield	2,026	—
Stoke	1,024	—
Derby	1,408	115
Wortley	—	1,132
Huntingdon	—	43
Cambridge	—	106
Northampton	—	72
Preston	—	60
Rockingham	—	189
Weedon	—	252
Stockton	—	16
Sheffield	—	332
Leicester	—	—
Nottingham	178	11
Leamington	—	48
Shrewsbury	—	347
Whitmore	—	12
York	—	5
Hull	—	—
Carlisle	—	—
Hereford	—	42
Hartford	—	120
Nuneaton	—	41
Parkside	—	135
Penrith	—	8
Crewe	—	90
Holywell	—	5
Stafford	—	19
	52,768	4,837

8. STATEMENT showing the Quantity of Cattle booked through and shipped from Dublin viâ Holyhead, and the markets to which they were forwarded, during 12 months ending 31st August 1865.

	Cattle.	
	Fat.	Lean.
Abergele	—	14
Carlisle	875	—
Chester	72	—
Conway	—	2
Carnarvon	16	—
Crewe	5	—
Flint	—	5
Hereford	—	2
Holyhead	—	606
Holywell	11	—
Dewsbury	—	30
Liverpool	2,510	—
Llanfair	20	—
London	8,620	—
Manchester	13,880	—
Market Harborough	—	876
Northampton	—	267
Oldham	—	5
Rhyl	—	8
Rugby	—	7
Stamford	—	185
Stafford	8	—
Watford	—	60
Weedon	—	17
Cambridge	—	84
Denbigh	—	4
Derby	263	—
Wolverhampton	566	—
Huntingdon	—	6,371
Peterborough	—	4,350
Wakefield	20	—
Leicester	—	1,216
Marsborough	3,207	—
Stoke	3,023	—
York	—	114
Leeds	—	38
Halifax	18	—
Doncaster	—	14
Sheffield	34	—
Nottingham	20	—
Macclesfield	23	—
Burslem	653	—
	33,844	14,277

9. Store Cattle Traffic ex Liverpool.

Date.	1864.	1865.	Destination.	
	Numbers.	Numbers.		
Sept. 9	84	44	Peterborough	Irish Cattle.
„ 16	237	20	Do.	
„ 23	374	198	Do.	
„ 30	882	515	Do.	
Oct. 7	261	64	Do.	
„ 14	399	59	Do.	
„ 21	237	103	Do.	
„ 28	882	Nil.	Do.	
Nov. 4	637	Nil.	Do.	
„ 11	617	58	Do.	
„ 18	545	54	Do.	
	5,155	1,115		

4,040 decrease in eleven weeks ending 18th November 1865.

The decrease in same traffic from Ireland viâ Holyhead will be nearly double the above.

In consequence of the disease amongst cattle, dealers are prevented from purchasing in Ireland for English fairs and markets, and there being more than an average crop of gr and roots in that country the graziers are enabled to buy and feed; we may therefore anticipate a very considerable tra after Christmas, providing the disease moderates and the restr tions are taken off the fairs and markets, otherwise they will kept in Ireland and fattened for the English markets.

10. Total Cattle Traffic carried upon the London an North-western system for 12 months ending 31 August 1865.

Month.	Horses.	Cattle.	Calves.	Pigs.	Sheep
1864.					
September	1,754	37,473	2,404	30,042	126,54
October	1,780	57,998	4,135	37,417	120,88
November	1,490	52,576	3,850	40,958	64,86
December	453	28,830	2,630	44,571	63,19
1865.					
January	617	22,632	2,793	43,799	82,03
February	822	20,494	3,812	37,473	76,68
March	841	25,847	11,111	41,536	84,15
April	942	40,471	18,445	37,901	91,15
May	1,801	44,155	13,308	37,510	113,58
June	2,502	27,144	4,571	27,499	140,57
July	1,842	18,617	2,983	19,816	157,38
August	1,496	28,756	2,081	25,307	169,41
	16,340	404,993	72,523	423,829	1,290,46

11. STATEMENT showing the Quantity of Store Catt forwarded from Dublin, viâ Holyhead, to Hunting don and Peterboro', from the 1st September 25th November 1865, as compared with th corresponding period in 1864.

From	To	1864.	1865.	Decreas
Dublin	Huntingdon	1,141	123	1,018
Do.	Peterboro'	3,296	1,075	2,221
Dublin and Meath Stations	Do.	231	—	231
Do.	Huntingdon	997	62	935
Dublin and Drogheda Stations	Do.	2,361	—	2,361
Do.	Peterboro'	176	—	176
		8,202	1,260	6,942

MR. CAWKWELL to the SECRETARY.

London,
6th December, 1865.

SIR,

SUPPLEMENTARY to the statements handed in b me a few days ago, I now beg to send a comparative retur of the store cattle forwarded from Dublin, viâ Holyhead, t Huntingdon and Peterboro' (the two great receiving place for cattle for the eastern counties grazing district), from th 1st September to the 25th November, 1864 and 1865 showing a falling off this year of 6,942 head, upon a gros number of 8,202 for 1864.

This comparison will be found to bear out my repre sentations, that the English dealers and farmers were averse to introducing fresh or strange beasts at present into thei stocks, and that the store cattle was now being kept an fatted in Ireland, instead of being sent as usual to England

Yours truly,
W. CAWKWELL.

The Secretary to the Commissioners on the Cattle Plague, &c. &c.

Appendix E.

Returns furnished by Edward Ballard, Esq., M.D., Medical Officer of Health, Islington.

Requirements of the Medical Officer of Health for Cow-sheds about to be licensed in Islington.

The cow-sheds are visited, as a rule, at short intervals ring the year by the inspectors of nuisances, and annually ore the day of licensing by the Medical Officer of Health. less the following requirements are complied with the nce is opposed by the vestry.

1. A minimum cubical space of 500 feet must be allotted each cow. [I do not regard this as sufficient space, since ykeepers as a rule object to any thing like a good ven-tion. I have been overruled however in this matter by Sanitary Committee. At my representation the licensing gistrates have given notice that next year they intend uiring 1,000 feet per cow to be provided. In calculating space per cow, I take, not the number of cows existent he shed, but the number for which there is standing m. Even the minimum of 500 feet has not been orced hitherto by the licensing magistrates in the tance of old sheds.]

2. At least three feet in width of superficial space must provided for each cow.

3. Provision must be made for a proper ventilation.

4. The gutter at the tail of the cows must be laid either h asphalte—the best paving of all—or with good or glazed bricks on edge; in either case upon a bottom of four inches of well-laid concrete, and be properly sloped to a trapped gully communicating by a sufficient drain with the sewer.

5. There must be a brick dung pit cemented within and covered, and provided with a proper drain—outside the shed where practicable.

6. There must be a grains-pit of brick cemented within, covered and properly drained into the sewer.

7. There must be an ample supply of water. For new sheds New River water must be laid on, and in all cases the supply to the attached dairy must be from this source.

8. Each year prior to licensing, the sheds must be thoroughly lime whited.

9. The yard attached to the shed must be properly paved and drained.

10. The licensing of any new shed is absolutely opposed when established in a crowded or poor locality, or too near to inhabited houses. Any old shed is opposed where during the past year there have been any serious complaints of nuisances arising from it, or when a proper amount of cleanliness has not been observed.

Edward Ballard, M.D.,
Dec. 7, 1865. Medical Officer of Health.

Returns showing Progress of Disease, Conditions of Sheds, &c., in Islington.

fected Sheds up to 30, 1865, in order of Attack, ly as can be ascertained.	Habitual Cleanliness, &c.	Number of Cows usually kept.	Cubical capacity of Shed.	Cubic Feet per Cow.	Water Supply	Dung Pit within Shed?	Number of Cases of Cattle Plague to November 30.	Died or slaughtered on account of Cattle Plague.	Number of Cows on November 30 in Shed.	Number ill with Cattle Plague, on November 30.	Brought in since Infection of Shed.	Cases among Cows newly brought into infected Sheds.	Remarks.
nber:—			Ft.										
, Liverpool Road - - -	Good	120	75000÷80=	937	Well in shd	0	11	116	13	—	13	0	Shed newly paved, limewhited, and disinfected, and drainage altered before new cows brought in; large shed was emptied.
n, Swan Yard, Upper Street -	Good, new.	20	{7000÷12= 3360÷ 7=	683 480}	N.R.	0	20	20	7	—	7	0	Shed previously thoroughly disinfected with chloride of lime, and limewhiting, and Condy's fluid; shed all along had 1 cow in it which did not have disease.
ve, Edwin, Upper Queen Street	Good	14	3767	269	Well in yrd	+	8	8	Empty	—	—	—	
d, Hale Street - - - -	Bad	16	14700	918	Well in shd	+	20	20	Empty	—	4	4	Lost his licence, having converted his shed into stables.
and Harvey, Duncan Street -	Good	400	158508÷200=	792	N.R.	+	200	168	74	1	Yes	Many	Has been buying in ever since commencement of disease; commenced in new shed of which measurement is given; did not disinfect properly, and fodder was stored in infected shed.
ve, Frederick, Elmore Street -	Good new.	43	14229	330	Well in yrd	0	43	42	1	—	—	—	
ornsey Road - - - -	Good	15	11662	777	N.R.	0	5	3	9	—	4	0	Has never been empty; has used disinfectants.
. Paul Street - - - -	,,	13	{3696÷8= 3360÷7=	462 480}	Well in yrd	0	11	11	3	—	Yes	0	Occupy same yard in a mews; limewhited after the disease, and emptied shed.
and Lowther, St. Paul Street -	,,	7	3360÷7 =	480	,,	0	7	7	1	—	Yes	0	
Bride Street - - - -	,,	8	2100	262	N.R.	+	5	5	Empty	—	—	—	
ll and Hoyte, Prospect Place -	Bad	5	About 8000	1600	,,	0	6	5	13	—	12	0	Shed limewhited, and has used Condy's fluid, and has used Stockholm tar; shed never quite emptied.
Sutterby Place and Mews -	Good	11	{3600÷6= 2400÷5=	600 480}	,,	0	10	10	8	—	8	1	Limewhited and disinfected, but was never empty.
Roman Road - - - -	,,	50	40420	808	,,	0	34	24	19	—	Yes	0	Never quite empty; disinfected well, and limewhited.
, Barnsbury Grove - -	,,	16	6006÷12=	500	,,	0	20	12	9	3	Yes	6	Never quite empty; used abundance of chloride of lime.
laiden Lane (Fields) - - -	Good, old	22	4687	213	Well in yrd	0	22	22	Empty	—	—	—	
Thornhill Road - - -	Bad	20	13440	672	N.R.	+	19	17	7	—	Yes	Yes	Never quite empty; disinfected with chloride of lime, and limewhited.
gton, Gifford Street - - -	Good	8	3780	472	,,	0	6	6	Empty	—	—	—	
ss. New Wharf Road, King's	Bad	7	6624	946	,,	+	4	4	5	—	Yes	0	Emptied thoroughly; limewhited imperfectly.
Hemingford Road - - -	,,	4	3168	732	,,	+	2	2	Empty	—	—	—	
Roman Road - - - -	Good	7	3120	480	,,	0	7	4	3	—	—	—	
t, Strahan Place, Ball's Pond -	,,	11	8550	777	,,	0	11	11	1	—	1	0	Shed thoroughly disinfected before new cow brought in, and emptied shed completely.
Strahan Place, Ball's Pond -	,,	6	2520	420	,,	0	6	6	Empty	—	—	—	
Prospect Place, Ball's Pond -	Bad	5	1892	374	,,	0	5	1	Empty	—	—	—	
Northampton Mews - - -	Good	9	4950	550	,,	0	9	6	Empty	—	—	—	
New North Road - - -	,,	24	6056	252	,,	0	21	21	5	—	5	0	Shed thoroughly disinfected after all cows were gone, and before new cows brought in, and emptied shed.
Upper Holloway - - -	,,	18	10240	568	,,	0	14	11	2	—	—	—	
Andover Road - - - -	Good, new.	4	4797	1199	,,	0	4	2	2	—	—	—	Had plague in August; previously had lung disease.
on, Hamilton Place - -	Good	14	Open shed	—	—	—	10	8	Empty	—	—	—	The cows were in field when attacked.
son, Canonbury Road - -	,,	5	6140	528	N.R.	0	1	1	Empty	—	—	—	
e., College Street, Highbury Vale	,,	6	9240	1540	,,	+	6	6	2	—	2	0	New cows bought from Marshall, who had them fresh from the country; emptied shed, having previously limewhited and disinfected.

Returns showing Progress of Disease, Condition of Sheds, &c., in Islington—*continued.*

Infected Sheds up to November 30, 1865, in order of Attack, as nearly as can be ascertained.	Habitual Cleanliness, &c.	Number of Cows usually kept.	Cubical capacity of Shed.	Cubic Feet per Cow.	Water Supply.	Dung Pit within Shed?	Number of Cases of Cattle Plague to November 30.	Died or Slaughtered on account of Cattle Plague.	Number of Cows on November 30 in Shed.	Number ill with Cattle Plague on November 30.	Brought in since Infection of Shed.	Cases among Cows newly brought into infected Shed.	Remarks.
July to September (*continued*):—			Ft.										
Jury, Caledonian Road	Good	14	5800	414	N.R.	0	1*	1	1	—	3	0	Sent 12 to Metropolitan C ket before disease, an quently; brought in fr Market afterwards, on they did not turn emptied and disinfecte
Charlton, Caledonian Road	Bad	5	7424	1484	„	0	1	1	Empty	—	—	—	Has not applied for a ne
Gibson or Crofts, Hollingsworth Street	Good	10	4725	472	„	0	2	2	3	—	3	0	Shed limewhited and c
Cattermole (?)	„	6	3240	540	„	0	1	1	5	—	—	—	previously to introdu cows; emptied thorou
October:—													
Clayton, Bemerton Street	Good	6	3060	510	N.R.	+	3	3	2	—	—	—	
Tilston, Wells Yard	„	41	8190÷22= 372 2392÷ 6= 398 3380÷ 8= 422 1440÷ 5= 288		„	0	9	6	2	—	—	—	Sent 33 cows to slaughter outbreak; a series of partly open on the 3 yard.
Humphries, George Street, Caledonian Road.	Bad	5	2740	548	„	0	2	—	3	—	—	—	
Preston, Porter's Mews, Holloway Road	Good	4	2430	607	„	0	2	—	Empty	—	—	—	Sold all off.
Young, Highgate Hill	„	7	3842	548	Well in yrd	0	6	6	„	—	—	—	
Webb, Chapel Place	Bad	5	4502	918	N.R.	+	4	4	„	—	—	—	
Clarke, Rutland Terrace	Good	6	2688	448	„	0	1	1	„	—	—	—	
Dudman, Durham Road	„	11	4620	420	„	0	3	3	„	—	—	—	
November:—													
Ragg, Hanley Road	„	19	8586	452	„	0	1	—	1	—	—	—	Said to have sold off his slaughter from fear; some diseased.
Vicary, Bolingbroke Terrace	„	18	4200÷3 = 525 6912÷15= 460		Well in shd	0	1	—	7	—	—	—	Slaughtered 14 cows fro disease on first case ha
Rogers, Hornsey Rise	„	13	12000÷17= 705		N.R.	0	3	2	7	1	—	—	Sold 4 healthy cows at t for fear; free openin through hay loft; us 4 horses in shed.
Cotton, Camden Road	„	30	12878	429	„	0	1	1	Empty	—	—	—	Removed cows to Finch in epidemic; the one
Cook, Hornsey Road	Bad	7	3872	553	„	0	1	1	„	—	—	—	brought from Finchl quently.
Sheds unaffected up to November 30.													
Smith and Jordan, James Street, St. Peter Street.	„	13	15120	1163	„	0	—	—	12	—	—	—	
Wellford, Upper Holloway	Good	22	Mostly open	—	„	+	—	—	Empty	—	—	—	Removed his cows to
Benjafield, Junction Road	„	10	7440	744	„	0	—	—	2	—	—	—	early in epidemic.
Chesley, Bingfield Street, Caledonian Road.	„	10	3213	321	„	+	—	—	3	—	—	—	
Dunnethorne (late Wells), South Street	„	3	7956	2652	„	0	—	—	2	—	—	—	
King, Hemingford Road	„	9	8910	990	„	0	—	—	10	—	—	—	
Haward, Matilda Street	„	18	6400÷14= 457 3222÷ 6= 537		„	0	—	—	13	—	—	—	
Pye, Copenhagen Street	„	3	2800	933	„	0	—	—	3	—	—	—	
Sargent, Bryant Mews	„	3	2060	686	„	0	—	—	3	—	—	—	
Maynard (?), Gifford Street	Bad	18	12502	694	„	0	—	—	Empty	—	—	—	Lost his licence, having his shed into stables.
Davies, St. Peter Street, Kendall's Mews.	„	5	—	—	Well in yrd	0	—	—	3	—	—	—	
Samson, South Street	Good	2	2944	1472	N.R.	0	—	—	2	—	—	—	
Fleet, Northampton Street	Bad	5	6560	1312	„	0	—	—	5	—	—	—	
Stratton Orchard Street	Good	6	4050	675	„	0	—	—	5	—	—	—	
Tilston (?), Holloway Road	„	16	2520÷8 = 315 3380÷8 = 423		„	0	—	—	8	—	—	—	
Goodall (?), Queen's Road	Bad	5	2002	400	„	0	—	—	Empty	—	—	—	Sold all his cows off.
Morteboy, Archway Place	Good	12	5120	426	„	0	—	—	10	—	—	—	
Downes, Upper Cottenham Road	„	5	2925÷8 = 365		„	0	—	—	7	—	—	—	
Kirkland, Andover Road	„	6	2940	490	„	0	—	—	4	—	—	—	
Marshall, Highbury Vale	Good, new.	3	Open	—	„	0	—	—	Empty	—	—	—	
Frost, Highbury Vale	Good	8	8100	1012	„	0	—	—	7	—	—	—	

Addenda to Return.

A.

Showing the relation borne by the Size of the Establishments to the Outbreaks of the Disease.

Of 35 establishments containing less than 10 cows, 22 were attacked, or 62·8 per cent.

Of 22 establishments containing 10 to 20 cows, 15 were attacked, or 68·1 per cent.

Of 6 establishments containing 20 to 40 cows, 5 were attacked, or 83·3 per cent.

Of 5 establishments containing 40 to 400 cows, 5 were attacked, or 100·0 per cent.

The liability appears to increase with the number of cows kept. This is in favour of the view that attributes the origin to contagion, since large cowkeepers buy in new cows more frequently than persons in a smaller way of business and are thus more likely to introduce disease into their sheds.

B.

Showing the relation borne by the general Cleanliness or Dirtiness of the Sheds to the Outbreaks.

Of 53 establishments habitually clean and tidy 37 were attacked, or 69·8 per cent.

Of 14 establishments habitually dirty and slovenly 10 were attacked, or 71·4 per cent.

The difference is not sufficient to establish any connection between mere dirtiness and the occurrence of the outbreaks. The dirtiness usually consists in negligence in sweeping up the fresh evacuations and in sufficiently frequent limewhiting of the walls.

C.

Showing the relation between crowding in the Sheds and the Outbreaks of the Disease.

Of 44 sheds affording 200 to 600 cubic feet of space per cow, 35 were attacked, or 79·5 per cent.

Of 20 sheds affording 600 to 1,000 cubic feet of space per cow, 14 were attacked, or 70·0 per cent.

Of 9 sheds affording 1,000 and upwards cubic feet of space per cow, 4 were attacked, or 44·4 per cent.

This statement is in favour of crowding as promoting the outbreak of disease.

D.

Showing the relation between Crowding and the Outbreak of the Disease in large and small Establishments respectively.

Establishments—

Containing less than 10 cows:

Of 17 sheds affording 200 to 600 cubic feet per cow, 14 were attacked, or 82·3 per cent.

Of 8 sheds affording 600 to 1,000 cubic feet per cow, 4 were attacked, or 50·0 per cent.

Of 8 sheds affording 1,000 and upwards cubic feet per cow, 4 were attacked, or 50·0 per cent.

Of 1 open shed none were attacked.

Containing 10 to 20 cows:

Of 18 sheds affording 200 to 600 cubic feet per cow, 12 were attacked, or 66·6 per cent.

Of 7 sheds affording 600 to 1,000 cubic feet per cow, 5 were attacked, or 71·4 per cent.

Of 1 shed affording 1,000 and upwards cubic feet per cow, none were attacked.

Containing 20 to 40 cows:

Of 4 sheds affording 200 to 600 cubic feet per cow, 4 were attacked, or 100·0 per cent.

Of 2 sheds affording 600 to 1,000 cubic feet per cow, 2 were attacked, or 100·0 per cent.

Containing 40 cows and upwards:

Of 5 sheds affording 200 to 600 cubic feet per cow, 5 were attacked, or 100·0 per cent.

Of 3 sheds affording 600 to 1,000 cubic feet per cow, 3 were attacked, or 100·0 per cent.

The influence of crowding is only perceived distinctly in the smallest establishments. In the larger establishments other causes may have operated more forcibly.

E.

Showing the relation between the Sources of Water Supply and Outbreaks of the Disease.

Establishments—

Supplied from superficial wells upon the premises:
10, of which 9 were attacked, or 90 per cent.

Supplied by New River Company:
57, of which 37 were attacked, or 64·9 per cent.

The disproportion here is sufficient to lead to the belief that some influence was exerted by the greater impurity of the well water.

F.

Showing the Influence of Well Water in large and small Establishments respectively.

Establishments—

Containing less than 10 cows:

Of 3 supplied with well water 2 were attacked, or 66·6 per cent.

Of 32 supplied with New River water 20 were attacked, or 62·5 per cent.

Containing 10 to 20 cows:

Of 4 supplied with well water 4 were attacked, or 100·0 per cent.

Of 17 supplied with New River water 10 were attacked, or 58·8 per cent.

Containing 20 to 40 cows:

Of 1 supplied with well water 1 was attacked, or 100·0 per cent.

Of 5 supplied with New River water 4 were attacked, or 80·0 per cent.

Containing 40 cows and upwards:

Of 2 supplied with well water 2 were attacked, or 100·0 per cent.

Of 3 supplied with New River water 3 were attacked, or 100·0 per cent.

The influence is most marked in the establishments of medium size; little marked in the smallest establishments where the chances of any one cow suffering from this cause are less; and not obvious at all in the largest sheds where some other causes, such as liability to infection, predominate.

G.

Showing the relation between the Mode of storing the Dung and Outbreaks of the Disease.

Of 11 establishments (retaining their cows) where dung was stored within shed 10 were attacked, or 90·9 per cent.

Of 56 establishments (retaining their cows) where dung was not stored within shed 37 were attacked, or 66·0 per cent.

H.

Showing the Influence of storing Dung within the Sheds in large and small Establishments respectively.

Establishments—

Containing less than 10 cows:

Of 6 which stored the dung within sheds 6 were attacked, or 100·0 per cent.

Of 30 which did not thus store it 16 were attacked, or 53·3 per cent,

Containing 10 to 20 cows:

Of 3 which stored the dung within shed 2 were attacked, or 66·6 per cent.

Of 17 which did not thus store it 12 were attacked, or 70·5 per cent.

Containing 20 to 40 cows:

Of 2 which stored the dung within shed 1 was attacked, or 50·0 per cent.

Of 4 which did not thus store it 4 were attacked, or 100·0 per cent.

Containing 40 cows and upwards:

Of 1 which stored the dung within shed 1 was attacked, or 100·0 per cent.

Of 4 which did not thus store it 4 were attacked, or 100·0 per cent.

The influence is only perceived in the smallest establishments, but there it is distinctly. In larger establishments other influences predominate. The reason appears to be that in the smallest establishments the dung is retained longer and undergoes more fermentation, since it is not worth the while of a contractor to remove it until a sufficient load has collected. This is a practical difficulty which I have frequently had to contend with, and it will not be overcome until local authorities themselves are required to contract for the removal of dung in their several districts, such dung being regarded as their property just as dust and house refuse are at the present time. There is a permissive clause in the amended Metropolis Local Management Act, enabling vestries and district boards to contract for removal of dung, "with the consent of the owner;" but this proviso renders the clause inoperative, not because the majority of those persons who only keep a few cows, or one or two horses, would not willingly give their consent, but because of the uncertainty of a general consent being given, and the consequent difficulty the local authorities feel of entering into any contract at all.

I.

Showing the Influence of storing Dung in Sheds of different Degrees of Crowding.

Of 4 sheds storing dung within them, and affording 200 to 600 cubic feet per cow, 3 were attacked, or 75·0 per cent.

Of 35 sheds not thus storing it, and affording 200 to 600 cubic feet per cow, 27 were attacked, or 77·1 per cent.

Of 6 sheds storing dung within them and affording 600 to 1,000 cubic feet per cow, 6 were attacked, or 100·0 per cent.

Of 14 sheds not thus storing it, and affording 600 to 1,000 cubic feet per cow, 8 were attacked, or 57·1 per cent.

Of 1 shed storing dung within it, and affording 1,000 and upwards cubic feet per cow, 1 was attacked, or 100·0 per cent

Of 9 sheds not thus storing it, and affording 1,000 and upwards cubic feet per cow, 4 were attacked, or 44·4 per cent.

This influence is only made evident in respect of sheds affording 600 cubic feet and upwards per cow. In the most crowded sheds other influences predominate.

K.

Showing the Influence of storing Dung in the Sheds of varying Capacity.

Of 5 sheds storing dung within them, and of total capacity less than 4,000 cubic feet, 4 were attacked, or 80·0 per cent.

Of 25 sheds not thus storing it, and of total capacity less than 4,000 cubic feet, 16 were attacked, or 64·0 per cent.

Of 2 sheds storing dung within them, and of total capacity of 4,000 to 8,000 cubic feet, 2 were attacked, or 100·0 per cent.

Of 19 sheds not thus storing it, and of total capacity of 4,000 to 8,000 cubic feet, 13 were attacked, or 68·4 per cent.

Of 4 sheds storing dung within them, and of total capacity of 8,000 and upwards cubic feet, 4 were attacked, or 100·0 per cent.

Of 14 sheds not thus storing it, and of total capacity of 8,000 and upwards cubic feet, 10 were attacked, or 71·4 per cent.

This influence is thus demonstrable in sheds of all the above degrees of capacity.

Summary.

1. The Cattle Plague in Islington has attacked the larger establishments in preference to the smaller.

2. There is no evidence of the origin of the disease in mere want of cleanliness.

3. The crowding of cows within sheds appears to have favoured the outbreak of the disease in some instances.

4. Those establishments which supplied their cows with water from superficial wells suffered more than those which supplied them with water furnished by the New River Company.

5. The emanations from fermenting dung stored within the shed appear in certain instances to have favoured the outbreak of the disease. The general capaciousness of the shed, or the reverse, appear to have exercised no remarkable influences over the general result of this infringement of a sanitary law, but the influence of crowding of the cows seems to have predominated over it where the crowding was excessive.

6. The smallest establishments, from the less liability to any introduction of contagion, exhibit more distinctly than larger establishments the baneful predisposing influences of crowding and the emanations from retained and fermenting dung stored within the sheds. The influence of a supply of water derived from superficial wells is most obvious in the establishments of medium size.

In the largest establishments the influence of all these predisposing causes seems to have been over-ridden by some more important and immediate cause, such as would be the very much greater liability to the introduction of the specific poison from without.

Edward Ballard, M.D.
Medical Officer of Health for Islington.

Dec. 15, 1865.

Statement of beasts received for destruction at the three principal Boiling Establishments at Belle Isle in months July to November inclusive.

	July.		Aug.		Sept.		Oct.		Nov.		Total.	
	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.
Moggeridge -	–	1	–	52	–	20	–	17	–	–	–	90
Shonach - -	–	13	12	89	2	54	–	32	–	10	14	198
Atchelor - -	–	36	23	133	–	95	–	64	–	10	23	338
	–	50	35	274	2	169	–	113	–	20	37	626

Of the beasts brought in dead, there were only 3 bulls, 2 heifers, and 4 calves. All the rest, dead and alive, were cows.

From Low's lairs at Belle Isle, where cattle stand prior to market, there were received at boilers

In July - 8
„ Aug. - 64
„ Sept. - 21
„ Oct. - 16
„ Nov. - 4

} Total 113. All cows on their way for sale in market or returning therefrom.

Of the 611 cows which died or were slaughtered on account of the Plague in Islington, only 77 at the utmost, were received at the most convenient place for destruction, viz. Belle Isle; viz.—

In July - 0
„ Aug. - 38
„ Sept. - 33
„ Oct. - 6
„ Nov. - 0

} out of 547. „ 64.

Edward Ballard, M.D.
Medical Officer of Health.

Dec. 7, 1865.

Appendix F.

Statement of Precautions adopted in the Parish of St. Luke's, Chelsea, and of Results.*

The Vestry of the Parish of St. Luke, Chelsea,
Vestry Hall, King's Road, S.W.
2d December 1865.

Sir,

Your letter of the 25th ultimo, addressed to our inspector of nuisances, has been laid before the vestry, and I have been directed to reply to it. Should you at any future time require information from this parish, time will be saved by addressing your inquiry to me in the first instance.

The cowsheds have been visited by the medical officer of health and inspector of nuisances, and the cowkeepers warned of the extremely infectious nature of the disease.

A regular enumeration of the cows was made, and reported from week to week to ascertain whether any increase or decrease of stock had taken place.

The circumstances connected with any change were carefully inquired into, whence they came, where they went, what price they fetched, so that the first trace of disease was easily discovered.

The cowkeepers were already under the control of the officers of the vestry, to a certain extent, by the licence system.

They had bound themselves by agreement, a copy of which I enclose, to attend to limewashing, ventilation, removal of dung, washing down, &c. The inspector of nuisances was directed to watch that the agreement was strictly carried out. He was instructed to advise all cowkeepers to use special disinfectants, Condy's fluid, chloride of lime, &c., before disease appeared; also to advise them not to mix any fresh cattle with their stock, but to place them in some separate shed or stable for a fortnight or three weeks; to let no one who had come in contact with strange cattle visit the cowsheds, but to keep a man specially to attend on any new cows in their separate building.

The government inspector was necessarily excluded on this system until after disease appeared. When the inspector of nuisances was engaged in aiding persons who had the disease in their sheds he ceased to visit the other sheds for a time.

When disease appeared all the healthy cattle were sold at once for immediate slaughter. The sick were treated in various ways, but mostly died or were sold to the knacker. The manure was mixed with chloride of lime before it was allowed to be removed; the sheds were fresh limewashed, and as soon as the sick were dead or recovered were pitched, or covered over with gas tar, and again limewashed.

In several instances sheds have been emptied from false alarm. The government inspector has occasionally condemned animals as diseased which have been proved afterwards not to have been so. In several instances one cow only being ill in the shed, and the disease not spreading, the medical officer of health is of opinion that it was wrongly suspected to be Cattle Plague. In Chelsea there is no proof that it ever was conveyed from one shed to another in any other way but by the introduction of fresh cattle, except in one single instance where the means of infection were not traced.

The whole result has been that the disease has been proved to have been brought into the parish twice by infected cows, and once in a manner not quite determined, and that in one case only was it conveyed to a shed at a short distance. In all probability the sheds would not have become infected if in the two cases mentioned the medical officer of health and inspector of nuisances had been aware of the circumstances, and proper precautions taken. Further, it is not proved in the opinion of the medical officer of health that in any other case a shed did become infected with the Cattle Plague.

The inspector of nuisances wishes to draw the attention of the Commissioners to the preventive treatment which was used in a shed where a cow was condemned as diseased, and no other attack occurred, and also to the careless mode in which the slaughtered animals are removed in the advanced stage of the disorder.

He says, "We have found great benefit from the following: ½ pint of the best whiskey and 1 oz. of sweet spirits "of nitre mixed with arrow-root gruel, one quart to be "given to each cow."

"A most dangerous practice, and one sure to spread "the disease, is that the cows slaughtered at the worst "and last stage of the disease are taken to Trinity Square, "E.C., to be boiled down, all the way from Chelsea, S.W.; "they profess to plug them, but that is impossible, for "from the shaking of the cart there is sure to be some of "the mucus from the head and hinder part to drain on to "the public way; they also pretend to disinfect, and this "is done without opening the cow at all, by merely throwing disinfectants over the body outwardly. If this is to "be continued there should be proper covered carts with "india-rubber joints and hinges, air and water tight."

I beg to send you copy of a tabular statement prepared for another purpose, which perhaps may be of service.†

I am, Sir,
Your obedient servant,
Chas. Lahee,
Vestry Clerk.

M. Bernard, Esq.,
Secretary, Cattle Plague Commission,
House of Commons,
(Principal Floor, Room 10),
Westminster, S.W.

Parish of Chelsea in the County of Middlesex.

Metropolis Local Management Acts Amendment Act,
25 & 26 Vict. cap. 102. sec. 93.

Notice of Intention to apply for a Licence to a Cowhouse.

To the vestry of the parish of Chelsea.

I (A)
residing at
hereby give you notice, that it is my intention to apply for a licence from the ensuing Kensington Divisional Sessions of the Peace to use as a cowhouse the premises (B)
and I undertake, in case the said licence is granted, that the said cowhouse shall be thoroughly cleansed twice a day. That all manure and refuse shall be carefully swept up twice a day, and removed from the premises between the hours of 10 p.m. and 8 a.m. That the grain bins and other places for food or wash shall be kept in good repair, clean, and well covered. That no pigs shall be kept except in a suitable pigstye, which shall be constructed in such manner as the vestry approve. That the cowhouse and all buildings connected therewith shall be limewashed throughout their whole interior at least twice in every year, namely, during March and September.

Dated this day of 18 .

Signature_____.

(A) Here insert name and occupation.

(B) Describe the situation of the premises to be used as a cowhouse.

N.B.—The vestry will require that between every window, doorway, or other opening of the premises to be used as a cowhouse and every inhabited house there intervene sufficient space for free ventilation, and that no underground kitchen or cellar be so used. That the cowhouse be properly lighted and ventilated. That it be provided with a sufficient supply of water and with the necessary apparatus. That it be provided with properly constructed impermeable flooring and drainage communicating directly with the main sewer, and that the inlet to the drain be properly trapped and covered with a fixed grating, the bars of which shall not be more than three eighths of an inch apart, and that a sufficient number of covered receptacles be kept to contain all grain, food, and wash, and that these be kept clean and in good order.

* It having been stated that this parish had been remarkably free from the disease, inquiries were made which produced the above statement.

† See next page.

Name of Cowkeeper and Locality of Cowsheds.	Number of Cows usually kept upon his (*or* her) Premises.	Number sold or otherwise disposed of since the Outbreak of the Cattle Plague in this Country.	Condition when sold or otherwise disposed of.	Number remaining of the original Stock.	Cases of Disease since the Outbreak of the Plague in this Country, and other Particulars.
Mr. Lee, 27, Manor Street -	66	17 sold at market at intervals. 49 sold at market at intervals on account of the Cattle Plague appearing in the neighbourhood.	Fat	—	No disease on the premises.
Mr. Williams, Church Street -	45	3 sold at market - -	Fat	42	3 fresh calved cows brought in. No disease on the premises.
Mrs. Williams, Beaufort Street	45	9 sold at market - -	Fat	36	6 fresh calved cows brought in. No disease on the premises.
Mr. Freeman, Britten Terrace -	12	1 sold to a butcher -	Fat	11	No disease on the premises.
Mr. Collie, Upper Cheyne Row	10	2 sold at market - -	Fat	8	No disease on the premises.
Mr. Osmint, Cook's Ground -	13	——	—	13	No disease on the premises.
Mr. Morrison, Paradise Walk -	80	31 sold at market at intervals.	Fat	49	16 fresh calved cows brought in. No disease on premises.
Mr. Cæsar, Queen's Road West	8	——	—	8	No disease on premises.
Mr. Vickers, George Street -	46	11 sold at market and to Mr. Garland, butcher.	Fat	35	6 fresh calved cows brought in. No disease on premises.
Mr. Smith (late Coton), George Street.	10	4 removed to his shed in St. George's parish.	—	6	4 fresh calved cows brought in. No disease on premises.
Mr. Bunker, Little Cadogan Place.	7	1 sold - - -	Fat	6	No disease on premises.
Mrs. Walters, New Road, Sloane Street.	12	4 sold at market at intervals.	Fat	8	No disease on premises.
Mrs. Tunbridge, New Road -	18	15 sold at market at intervals.	Fat	3	No disease on premises.
Mr. Warne, Little Exeter Street	6	2 sold at market - -	Fat	4	No disease.
Mr. Willcox, Little Exeter Street.	18	13 sold at market -	Fat	5	No disease.
Mr. Dancocks, Fulham Road -	50	33 sold at market at intervals.	Fat	17	No disease.
Mr. Cross, Little Blenheim Street, and College Place.	60	19 sold at market at intervals.	Fat	31	No disease.
Mr. Freshwater, Keppel Street	3	——	—	3	No disease.
Mr. Hornsby, Francis Street -	4	1 sold at market - -	Fat	3	No disease.
Mr. Carnaby, Kensal Road -	4	——	—	4	No disease.
Mr. Wray, Marlborough Road	10	3 sold at market, and 7 sold at market in consequence of the disease appearing in the neighbourhood.	Fat	—	No disease on the premises.
Mr. Smith, Turks Row	8	1 sold previous to the disease appearing.	Fat	1 recovered from the disease, and now healthy.	6 cows died of the Plague, the introduction of fresh cows having given rise to the malady.
Mr. Robinson, Smith Street, Marlborough Road.	7	7 sold to a butcher -	Fat	None	2 fresh calved cows brought in. No disease.
Mr. Strutton, Smith Street, Marlborough Road.	50	50 sold by auction, a railway requiring the shed.	—	Shed empty	4 fresh calved cows brought in, and these 4 died of the Plague.
Mr. Humphrys, Princes Street	38	11 sold at market at intervals. 27 sold at market on account of the disease appearing in the neighbouring shed belonging to Mr. Strutton.	Fat	—	No disease on the premises.
Mr. Argeant, Richards Place -	20	17 sold at market on account of the disease appearing at Strutton's.	—	1	2 died of the Plague.
Mr. Cutler, Marlborough Road	48	18 sold at market - 29 sent to market on account of the disease at Strutton's shed, which stands adjoining.	Fat	—	1 cow slaughtered and sent to the knacker's.
Mr. Walker - - - -	41	7 sold at market - -	Fat	—	1 cow slaughtered, on the government inspector pronouncing it ill of the Plague.
Lower North Street (next Exeter Street).		32 sent to market by a health order from the government inspector on account of the disease having appeared in the adjoining shed.			1 ditto ditto.
Lower North Street (next Elizabeth Street).					10 fresh calved cows brought in, and all healthy up to this date.
Mr. Strutton, Leader Street -	6	6 sold (all) on account of the disease appearing at Strutton's other shed, Smith Street, Marlborough Road.	—	Shed empty	——
31 premises on which cows are kept.	745	430	211 fatted beasts.		

The whole of the sheds in the parish of Chelsea are limewashed three times during the year, at stated periods; they are well ventilated, furnished with a plentiful supply of good water, and thoroughly washed down twice in the course of each day. No accumulation is suffered to remain upon the premises, which are visited every day by the inspector of nuisances.

The disease has not been at all prevalent in the parish, and during the past fortnight there has not been a single instance of it.

The cows, for the most part, are fed upon the best meadow hay, upland grass, grains, swedes, mangel-wurzel, bran, pollard, bean-meal, pea-meal, wheaten-flour, barley-meal, linseed and oil cake, &c.

15th November 1865.

Appendix G.

Communication from H. Letheby, Esq., M.D., Medical Officer of Health for the City of London, on (1.) Slaughterhouses in the City; (2.) Diseased Meat sent to City Markets.

London, Sewers' Office, Guildhall.

Dear Sir, December 12th, 1865.

I regret that I was not able to attend at the meeting of the Commissioners last week, and as I may not be able to appear before them, as they have requested, I send you a copy of a late report of mine to the Commissioners of Sewers on the subject of the city slaughter-houses. You will perceive that in my opinion all these slaughter-houses in the city are a public nuisance, and that it would be a public advantage, in a sanitary point of view, if these slaughter-houses were removed to more convenient localities. This report has been considered by the Commissioners of Sewers, and they have resolved to memorialize the Secretary of State on the subject, and to say that, in their opinion, all slaughter-houses in crowded localities should be abolished. They are also of opinion that compensation should be given to those who would be injured by such a measure.

And as regards the other questions which the Commissioners desired me to express my opinion of, namely, the amount and condition of the diseased meat sent to the city markets, perhaps my tabular statement, which is published in the first report of the Commission, will be sufficient for the purposes of the Commissioners. I may add, however, that an enormously large amount of meat from animals affected with the Cattle Plague is now sent to the city markets, and I am afraid that such a proceeding is not only improper, on account of the possible injury to those who may partake of such meat, but it is highly dangerous as a means of propagating the disease; for, as the meat of diseased animals is undoubtedly capable of exciting the disease, the meat must infect everything with which it is brought into contact.

Not long ago we seized the carcases of several animals that had been affected with the disease, and sent to the city markets from Scotland. All along the road, therefore, the infected meat must have been a dangerous source of infection. I write this in haste, and remain

Yours truly,

To the Secretary of the Royal Cattle Plague Commission. Hy. Letheby.

Remarks by the Medical Officer on the condition of the slaughter-house in Hosier Lane and of the city slaughter-houses generally.

The slaughter-house in Hosier Lane is situated in a very crowded locality, and it has frequently been a subject of complaint by the inhabitants of the neighbourhood. It stands in a confined space between Hosier Lane, Cock Lane, and Three Diamond Court, near West Smithfield, and there are narrow entrances to it from each of those thoroughfares. The slaughter-house itself is about 38 feet long and 16 feet wide, and there are three stalls or pounds for beasts and one for pigs. At the present time they are killing about 120 beasts and 300 pigs a week, but they have killed in busy time about 200 beasts and 1,000 pigs a week. Every precaution is taken, as far as the observation of the Commissioners' rules is concerned, to keep the place clean and wholesome; but the nature of the trade, the closeness of the locality, and the unavoidable collection of filth, offal, dung, and blood renders it impossible to conduct the business without its being a nuisance to the neighbourhood, and in warm weather the nuisance is almost intolerable, but the Commission has no power to deal with it beyond the enforcement of the rules and regulations which have been made for the management of the city slaughter-houses, and these are found to be insufficient to prevent the place from being a great nuisance from circumstances over which the Commissioners have no control. At present there are 58 such slaughter-houses within the city of London; they are situated in Aldgate; in the Minories; in Great Tower Street; in Bee Hive Passage, Lime Street; in Bishopsgate Street; in Gun Yard, Norton Folgate; in Bread Street Hill; in Fetter Lane; in Fore Street; in Hosier Lane; and in Warwick Lane and Newgate Market, and every one of them is in a crowded locality, and is a subject of more or less annoyance to the neighbouring inhabitants. These slaughter-houses receive about 5,400 sheep, 1,800 beasts, 420 pigs, and 400 calves every week, making a total of more than 8,000 animals slaughtered in the city per week; and although this proportion is absolutely insignificant in comparison with the quantity of meat brought weekly to the city markets, yet it is sufficiently large to be the cause of a monstrous nuisance, for not only is there annoyance from the actual slaughtering of these animals and the filthy condition of the slaughter-houses, but there is also a further annoyance from the driving of the animals to them, and from the carrying away of the dung and offal, besides which there is maintained in the neighbourhood of them a class of offensive trades, such as fat and tripe boiling and gut cleaning, which still further add to the nuisance.

Appendix H.

Regulations respecting Cattle Disease in Russia and in Bavaria.

I. RUSSIA.

(*Transmitted by Sir A. Buchanan.*)

Medical Laws, 7th Division.

Regarding the measures to be taken towards the effectual warding off of Epidemics among Cattle.

Section I.

General Rule.

First Division.

What is to be done by the local authorities with a view to arresting and cutting off the progress of the Cattle Murrain.

1714. If in a town or in one or many villages there should be simultaneously many cases of sick horses, cows, sheep, or other domestic animals, and some of these should die in the course of only a few days, the police of the towns should be immediately informed thereof; and in villages the burgomasters, as soon as they shall have heard of it from those next in office or from unofficial sources, shall immediately impart the information to the police officer of the district.

Observation 1. If the murrain has appeared in a village under the jurisdiction of the department of crown lands, in that case information is immediately given to the heads of the village, and through them is sent on to the rural police, and to the superior local authorities of the department of crown lands, in the manner pointed out in s. 946.

Of the appearance of the murrain in encampments or in villages inhabited by foreigners, colonists, or other temporary sojourners, under the jurisdiction of distinct local authorities, information is forwarded in a similar manner to those authorities whose concern it is, and measures for putting a stop to the spreading of the disease shall be taken by the responsible police authorities within that jurisdiction. More detailed regulations on this head are contained in the statutes of each separate local administration and in the written byelaws supplied to each district office.

Observation 2. For failing to give information of, or omitting to take the prescribed measures for arresting the spread of, the epidemic, the offender or offenders will be subject to the penalties prescribed in ss. 1084–1086.

1715. Having received notice according to the rules mentioned above, the town police will furnish a certificate thereof, and give information to the authorities of the government in the district. The district police officer shall send the information to the rural district court.

1716. The sheriff, accompanied by the police medical officer or a veterinary surgeon, shall at once repair to the spot where the Plague broke out.

1717. Having examined the diseased and disinterred animals, the police or veterinary surgeon shall define the extent and nature of the disease, and then send information to the local authorities, about the nature and principal causes of the disease, the measures to be taken for arresting the progress thereof, the number of animals in the district, the breeds of the same, and the number of those which have died.

1718. The local police shall direct the people to adopt the necessary measures for the prevention and cure of the disease, in accordance with the rules laid down for their guidance.

1719. In villages within the jurisdiction of the department of crown lands the rural police is assisted by the local authorities of this department, viz. those in the villages, districts, and even in the courts, with the veterinary surgeons attached thereto. Their duties on such occasions are defined in the General Government Regulations, and partly in the first book of this code.

1720. The chiefs of provinces, on the appearance of the Cattle Disease in any district, demand full particulars from the local police, and after consultation with all the members of the medical court, or the inspector thereof, or the committee of public health, determine whether the means adopted by the local police for arresting this disease are effectual, and in accordance with the regulations laid down by law. Should these measures turn out to be ineffectual, or wanting in stringency, then, with a view to rendering them more so, the chiefs of the province act in concert with the government medical boards in making the arrangements that may seem to them expedient, according to the nature or degree of severity of the disease. Of the appearance of the disease, of the measures for cutting off its progress, and eventually of the disappearance of the same, they shall duly inform the ministry of the interior.

1721. On the appearance of the Siberian Plague, which is sometimes communicated from cattle to man, the chiefs of provinces shall also take care that this disease should be recognised and treated in accordance with the separate instructions of the medical board, laid down on this head, and that the local police should act, with reference to this disorder, independently of the general instructions on the head of diseases among cattle, and in accordance with separate instructions, which are given hereafter in ss. 1727 and 1728.

1722. The committees of public health, on receiving from any of their members the news of the appearance of epizootic diseases, shall use their utmost endeavours to prevent their spreading, and to put a stop to them, by application of the laws pointed out above in ss. 836 to 842.

Second Division.

The general preventive measures against the Cattle Plague.

1723. The medical council of the minister of the interior shall supply the public from time to time with instructions and guide books for the prevention and treatment of disease among domestic animals; these and similar instructions published by the medical council, with regard to the treatment of human beings, should be within reach of every one, and largely circulated among those who may want them. But, independent of the information and explanations contained in these instructions, the following rules and precautionary measures for the arrest of the disease among cattle must be adopted. (See ss. 1724–1728.)

1724. If the disease which has appeared anywhere amongst the cattle shall be found to have been caught from other cattle elsewhere, or to be infectious or contagious, in this case, previous to the receipt of the necessary instructions from the chief of the province, the following measures shall be immediately taken to prevent the spreading of the infection:—

1. On the least suspicion of an animal's being infected it shall at once be separated from the healthy beasts. As a general rule, on the appearance of the disease amongst them, cattle should not be let out to graze, but kept at home, and strict attention paid to the quality of the fodder, and the cleanliness of the stalls. Should it be impossible, owing to the quantity of cattle at the farm, to keep it at home, then when it is in the fields every care must be taken to prevent its getting near any road along which herds are driven; that the pastures into which it is admitted should not be boggy; and particular attention should be paid to those places where cattle fairs are held, or which adjoin the great thoroughfares through which cattle is driven from distant parts to the place where it is intended to be slaughtered. With this in view, in those villages where the disease has broken out, the cattle shall not be let out into the fields on days when fairs or markets are held, but every proprietor shall keep his stock at home. In the same way, strange cattle should not be admitted into the yards, or allowed to graze with that belonging to the place in question.

2. In summer, separate roomy pens shall be set apart for diseased animals in the fields, commons, or other cool localities, and every villager or shepherd should take care not to endeavour to hide or conceal any cases of disease which he may notice in his flock, but should, on the contrary, at once proceed to drive any animal in which the least trace of sickness is perceptible to the appointed receptacles for infected beasts. In the autumn and winter separate sheds and pens shall be set apart for diseased beasts.

3. For the sale of cattle a place must be set aside, into which the cattle of the place itself shall not be able to find their way, so as to keep the cattle of the place from all danger of infection.

4. Shepherds and cattle feeders shall on no account be allowed to go to places where the disease has broken out. Equally, persons whose cattle shows no traces of disease shall be most strictly forbidden to purchase either openly or secretly, in diseased districts, cattle, meat, milk, butter, hides, melted tallow, or other parts of oxen or other animals, and bring such into not infected districts, either for sale, or for domestic use.

5. Persons who have been about diseased cattle shall not be allowed to come near healthy beasts without first having changed their clothes, and then washed their hands, first in vinegar and then in kvas,* but first of all in a solution of potash. The clothes previously worn must be washed, or hung up in the open air for 24 hours. It is still better to have separate people altogether to look after diseased beasts. Then, on the disappearance of the disease, the clothes of these people may be purified by exposure to the air for 14 days.

6. Dead animals of the horned breed should be removed in carts drawn by horses, but care must be taken to avoid any liquid matter from the carcase dropping along the road, and as a general rule a carcase should not be touched with naked hands.

7. Neither the skin, horns, or hoofs, shall be removed from a dead animal.

8. The carcases of diseased cattle shall be buried in deep holes, far away from the dwellings of man, and from spots where healthy cattle feeds. It is better to choose open spaces for these holes, and not wooded parts of the country, where there would be more danger of the carcases being dug up by wolves or other animals, and thus the disease spread abroad, and besides it is easier to pay more attention to these holes in open spaces.

9. When carcases of diseased cattle are buried the earth should be well trodden down into the hole over them.

10. In summer flies are apt to communicate the disease from diseased to healthy cattle, by settling on their backs alternately; to avoid the danger of this, healthy cattle shall be besmeared with tar.

11. Harness which has been used on diseased cattle shall not be used again until it has been washed with potash water or salt water, and then well aired, and covered with a coat of tar.

12. For the security of travellers, in the time of cattle disease by-roads shall be made, leaving aside those villages where it has appeared, and the old roads shall be blocked up or quite obliterated so long as the infection may be about.

13. Dogs, cats, and domestic fowls should not be allowed to get near either diseased cattle or the carcases of beasts which have died of the disease.

14. All the dirt, litter, dung, &c. of animals that have died should be buried along with their carcases, or, if possible, burnt.

15. In general, whilst the disease is raging both sickly and healthy cattle should be kept in as roomy places as possible, the stalls should be cleaned out frequently, and fumigated with vinegar or kvas, these liquids being poured on the heated bricks or stones of the floors; the beasts themselves should be frequently curry-combed or rubbed down with straw, to keep up the perspiration. Burning juniper, brushwood, dung, &c. is useless, and even dangerous in enclosed places.

16. No food, utensil, rope, or anything which has

* Kvas is the usual beverage of Russian peasants, and is made of stale rye bread mixed with malt, on which boiling water is poured and left until it has fermented.

been in the stable or shed with diseased cattle, shall be made use of again.

17. Healthy cattle, during the time that epizootic diseases are raging, such as the cattle plague, the epilepsy, inflammation of the lungs or such like, shall be fed in summer on grass, and in winter on hay, damped with warm water, and a little salt should be given every day in the food or drink, and if this is done the quantity of food may be diminished.

18. Besides all this, healthy cattle must all have setons inserted; in cows through the skin of the dewlap, and in horses, on the chest. A greased hempen or horsehair cord shall be drawn under the skin, and pulled backwards and forwards several times a day, to keep up a discharge of liquid matter.

19. In other matters it will be necessary to obey the injunctions of the medical men and veterinary surgeons, and to render these every possible assistance to arrest the disease, as well as to carry out the instructions which have been given them.

1725. The medical instructions are contained, as already stated, in separate orders, published and circulated for this purpose; but, before the arrival of the physician or veterinarian, it could do no harm if members of the rural police and every proprietor of live stock were acquainted with and made use of the following simple remedies:—

1. Never to give animals any dry food, such as hay or straw, but grass or hay moistened with warm water; the drink to consist of water boiled with oatmeal, or with oatmeal and barley, or if these are not to be had with bread or rye flour; to this may be added salted cucumbers or sour apples bruised and prepared in the same manner as whey.

2. As soon as an animal ceases to chew the cud give it a salt herring, or if this is not at hand a lump of rye bread which has been licked by a healthy animal; the drink to be eight parts of water with one part of red or white vinegar. A bottle of whey may be used instead, or even kvas.

3. If the animal be very hot kvas grounds may be beneficially employed, as well as beer yeast, with saltpetre, or with common salt. Take half a pail of yeast or grouts, and add a handful or two of saltpetre, or instead of this the same quantity of common salt, mix well, and give the animal a bowl of it three, four, or five times, as the case may be.

4. For the same purpose one may make use of the brine in which cucumbers have been salted, or cucumbers themselves mashed to the consistence of porridge.

5. If the animal be troubled with constipation, at once give it half a bottle full of hemp or linseed oil, well mixed up with an equal quantity of barley water. If no effect be produced in two hours then repeat the dose, and, should the animal refuse to take it, pour it down its throat.

6. If the animal be suffering from diarrhœa give it the drink alone, without salt, as directed in the first part of this paragraph.

7. If the animal have pustules in the mouth, they or the tongue must be rubbed with clear vinegar, mixed with honey or treacle, or with corn brandy and salt water in equal proportions. The rubbing must be done with a sponge, or a bit of rag fastened on to a stick.

8. Should the feet be swollen or benumbed make incisions in them, and when the blood flows wash them with vinegar and corn brandy; cracks in the hoof may be rubbed with tallow, butter, or oil, mixed with turpentine.

9. When there are swellings on the neck or between the legs, apply roasted onions at once, mixed with equal parts of garlic, and mustard, or horseradish, so that suppuration might soon come on; the abscess to be opened with a sharp instrument, and oil with turpentine applied as indicated in Part VIII.

1726. To avoid any evil consequences to which even men are sometimes subject to, in times of severe epidemics among cattle, particularly in hot weather, the following precautionary measures must be taken:—

1. Men who are attending on sick animals should, before going near them, wash their hands in vinegar, and tar their gloves. On leaving the animals they should wash their hands again.

2. Diseased animals should not be made use of for food, as dangerous fevers may arise therefrom.

3. If a fly, after having been sitting on a diseased or a dead animal, should bite or sting a man, he should immediately rub the place with warm olive or hempseed oil, preferably the former. Should the swelling not go down a plaster of flour, treacle, and bruised onions, should be applied, for the sake of creating a blister; and when this latter has gone down, the place should be rubbed with hempseed oil. In the meanwhile he should drink freely a mixture of vinegar and warm water, and dress warm to keep up a perspiration.

1727. In the event of the breaking out of the Siberian Plague, the duties of the police, besides the regulations specified above in ss. 1726 and 1724, will include the following:

1. Not only to prohibit all communication between sick and healthy cattle, but also between people who have to look after diseased cattle, and those who are in attendance upon healthy beasts.

2. To secure a continual and unremitting attention, during the presence of the Plague, to the rule that the flesh of the diseased beasts should not be used for food, a thoroughly practical *employè*, and one well conversant with the feature of the disease, shall be resident at all the slaughtering places, who shall see to the condition of health of cattle brought to be slaughtered; and should any meat turn out to be bad, he shall order the same to be removed immediately to places which shall be specially appointed for it, and there it shall be buried, as hereafter specified.

3. Milk, and even butter and cheese, from infected animals are bad for food, and therefore when there is any milk which has come from diseased animals it should not only be prohibited to use such for food, but it shall not even be given to herbivorous cattle, and the employed official shall see it thrown away in his presence, in a place which shall be set apart for the purpose.

4. Towards the end of the disease the wooden and other articles that have been in contact with diseased animals must be washed in a solution of chloride of lime, or else fumigated with strong hydrochloric acid. Things made of metal should be made red hot, the earth removed to the depth of 14 inches, and replaced by new earth. The walls of the stables to be washed with a strong solution of potash, or still better, with a solution of chloride of lime several times, then white-washed, and exposed to the air for 14 days, before healthy cattle is put in them.

5. The dead animals must be conveyed a considerable distance from any habitation, and buried at least three arshines (7 feet) deep; and in order to prevent persons from disinterring animals for the sake of the skins, it is necessary to cut these into small pieces, before the animal is buried, so as to render them useless to any one hereafter.

1728. The surgeon and attendants who are on duty where the Siberian Plague is prevalent are to observe the following precautions:—

1. To take every precaution to prevent any liquid from a diseased animal from coming into contact with the face or eyes.

2. The hands should be rubbed with fat or oil.

3. Those troubled with pustules, chaps, or scratches in the face, and more particularly those who have such on their hands, should not come near the diseased animals, and carefully avoid touching their sores.

4. As a general rule, neither the mouths nor sores of diseased animals should be touched with the naked hand.

5. The carcases shall not be cut open until they have had time to get cold.

6. Should any pestilential fluid come in contact with any delicate part of the human body, that part must be rubbed immediately with a solution of salt, chloride of lime, potash, lime water, or a weak solution of hydrochloric acid.

7. When the disease has passed, the clothes and everything which has been in contact with sick or diseased animals should be exposed to the fumes of concentrated muriatic acid, and well aired, or, what is still better, burnt. The whole body to be then washed with soap and water, until which is done neither surgeon nor the attendants who had been in contact with the diseased animals shall be able to mix with the people, without imminent danger both to themselves and to the people.

1729 to 1734 contain certain rules to be applied in the Semipalatine district and that of the Siberian Kirghis, of no interest whatever.

Transcribed and translated by

FREDERIC STILL,
H. B. Majesty's acting Consul, St. Petersburg.
GEORGE L. CARRICK, M.D.

II.—BAVARIA.

(Transmitted by Lord A. Loftus.)

A General Précis of the Rules and Regulations in Bavaria for the prevention and suppression of the Rinderpest, commencing with the year 1788, contained in Vol. XV., from page 534 to 714, and in Vol. XXX., from page 184 to 202, of the Bavarian "Administrativ-Verordnung."

Rules laid down in Ordonnance of 18th July 1788 refer to—

I.—Police regulations to be taken previous to the outbreak either in the country or any separate locality in the country.

II.—Police regulations to be taken when the disease has appeared, to prevent its spreading.

III.—Police regulations when the disease has disappeared, to prevent its return.

Under Tit. I. are ordered:

Inspection of all horses, cattle, in every place.

For this purpose, in every district, every person is obliged to give in a list of his cattle.

Inspection of all cattle imported from other countries, also all cattle sent to markets or fairs to undergo inspection previous to their entry into the fair or market.

Diseased, or sick, or convalescent cattle are forbidden to be grazed in the open fields.

Cattle to be watered with pure water, with a small portion of vinegar or salt.

Cattle never to be driven out to pasture before an hour after sunrise, and never during the early fog or frost; should be previously fed with a handful of forage.

Cattle never to drink out of dirty or standing pools.

The night pasturage to be wholly avoided.

Under Tit. II.:

1. Separation of the diseased from the sound cattle.
2. In places where the disease has shown itself no cattle, either sound or diseased, to be allowed entry or exit.

   All cattle, sound or diseased, in a diseased place or district, to be marked with the two first letters of the name of the place.

   The diseased ones to be in addition washed in red oil colour on the horns.

   In any diseased district or locality neither straw nor hay nor wood to be allowed exit.
3. Prevention of spreading of the disease by men.

   No person attending on diseased cattle to be allowed to attend or approach sound cattle except at least in fresh clothes. None attending such cattle to be allowed to do so wearing any woollen apparel.
4. To prevent contagion by the hides, excrements, by other animals, etc.

   All carcases of diseased cattle to be buried in pits 8 feet deep, not too many together, and to be transported thither in barrows or on litters.

   These pits to be prepared ready in an infected district, to be buried by men especially appointed, and who do not approach afterwards the sound cattle.

   No remains of diseased cattle to be kept to feed dogs, etc.

   The dung of diseased cattle to be burnt.

   Care to be taken that no portion of the diseased cattle be thrown into rivers or on roads, or on dung heaps, or into woods.

   All dogs, cats, or pigs which may have eaten of any proceeds of diseased cattle, to be killed immediately, and to be buried 8 feet deep.

   The hides of diseased cattle to be only taken off the carcase at the place of interment, and to be then given to appointed tanners to be steeped in lime.

   Should the hides show much of disease, they are to be buried with the carcase.
5. Prevention of the spreading of the disease among men by eating diseased meat.

   By *public* slaughter-houses

   In all places where are butcher-stalls or shambles.

   The slaughtering and sale of meat in houses is prohibited by a strict supervision of all meat by properly appointed officers, in places where no butcher-stalls or shambles exist.

   Also by prohibiting secret sale of meat.

Tit. III.—Police regulations on the disappearance of the disease to prevent its return, are—

1. All utensils used by diseased cattle to be burnt.
2. All utensils of iron to be passed through the fire.
3. The barrs to be renewed or at least to be planed, and washed in quick lime-water for 14 days.
4. The wooden or paved flooring to be taken up.
5. The earth to be removed 1 foot deep and replaced with new.
6. The walls scratched.
7. The wooden stalls and coverings, and the pavement on which the forage has lain, to be washed repeafedly with alealine, and afterwards with lime.

   The stall to be smoked daily with juniper berries, vinegar, and camphor, to be well aired and not be used again for two months after the last diseased cattle was in it.

   Further, the hay and after grass, straw, and even the short straw, either above or in the vicinity of the diseased stable, to be again taken to the meadow and remade, and then mixed with herb forage after two months, but not to be given to the newly purchased cattle.

   The cattle recovered from the disease only to be allowed in the pasture 6 weeks after convalescence.

Annex to Decree of 9th June 1796.

Medicinal Information.

The Hornviehseuche, which has in so many places completely devastated Bavaria, is no new malady. In this century it is now its fourth appearance, and threatens the cattle with the same devastation as in the years from—

1713 to 1716
1729 to 1735
1742 to 1745

It was so severe and fatal, that in Bavaria and Suabia it was very rare to see a head of horn cattle. Several names have been given to this disease,—

Löserdörre,
Uebergallung,
Ruhr, etc.

(Löserdörre is a real typhus boum orientalis, the other are synonymous.)

None of these, however, exactly corresponds with its nature, and might easily mislead in the adoption of remedies. The name is real malevolent Hornviehseuche, and its nature an entire relaxation of the vital strength, and disposition of all the juices to rapid corruption or putrefaction.

However rapidly the disease kills, three stages can be clearly given,—

1. The period of infection.
2. That of the outbreak.
3. That of the course of the disease.

Symptoms of the first period.

a. A loathing for food and drink.

This loathing is not continuous. It passes off, and the animals only lose their entire appetite when the disease has actually broken out or is on the point of doing so.

b. A sparing and dry evacuation.

c. Mites or the so-called Dörrwürmer in the mouth.

d. A small quick pulse. It is felt on the extreme jaw. In a healthy state 35 to 40 pulsations are felt in a horse or cattle per minute.

e. Unequal changing warmth. The horns and the ears of a diseased animal are sometimes entirely, sometimes only partially cold, sometimes warm. The same intermittence of heat is observable on the skin.

f. A slight cough. When an animal gives this symptom, or when one or two in the locality dies, or has been killed in consequence of this symptom, it may be certain that the outbreak of the disease will take place in a few days.

In this case are to be adopted—

1. The Police Regulations (as aforegiven).
2. Only a third of the usual forage should be given to the diseased animal.
3. A decoction of strongly boiled barley or linseed, with vinegar, should be given to the animal to drink.
4. A leather soaked in vinegar and Spanish flies, or a cord of the same, or also the winter aconite (Christwurz, helleborus niger, now less used for this purpose than for embrocating any diseased part of the skin,

and as an emetic) to be placed on the Triel (the protuberant part of the chest, between the fore limbs of cattle).

5. This leather must remain on three weeks, and the rising of the blister be washed every morning with tepid water. If the rising should be considerable,
6. The wound must be opened with a lancet and creased with basilicon ointment or fresh butter.
7. Every morning powder No. 1. must be given to the animal.
8. The kauprügel (an instrument used in veterinary science to effect the breaking upward of the wind in the abdomen in case the inflation is tympanitic), which is tied at the ears to the horns, must be put into the mouth of the animal, left there half an hour, and then
9. The mouth cleanly washed out with No. 2.; an hour afterwards moderately fed.
10. Every evening the medicine No. 3. must be given, the kauprügel put into the mouth, the mouth washed out, and an hour afterwards fed.
11. If the symptoms mentioned under *a*, *b*, *c*, *d*, *e*, disappear, the animals may be said to be well, and the course of remedy mentioned partially, but not all at once, discontinued. It cannot be determined in how many days an infected animal may require to be restored, the experience has proved that this course of remedy continued for eight days is sufficient to protect cattle not infected, and to insure them against the disease, if the prescribed medicines are given once or twice a week. With cattle treated in this manner and afterwards slaughtered, it was found on opening them that the entrails, and, what is especially to be noted, the gall-bladders, were in their normal state. Only the four ventricles and bowels had something unnatural, and appeared as if they had been washed out and wrinkled.

The gall was thinner, more watery. The blood let out from the veins before being slaughtered was black, and could not be brought to congeal, but remained like watery brine, half liquid.

Proofs of the outbreak.

In a few days the second stage commences; the symptoms are—

1. Cold horns, ears, and members.
2. Shivering of the whole body, and especially of the hind legs.
3. Bristling of the hair.
4. Gnashing of the teeth.
5. Shaking of the head.
6. Involuntary rising from the stomach, whereupon follows heat, and the diseased animal lays itself on the straw.
7. Breathing quickly, with oppression.
8. The heat is especially in the horns and ears, but more particularly observable by the
9. Pulse, which often mounts to 85–90 pulsations per minute. From thence the state of the animal is most dangerous, and the disease hourly increases. The animal should not be left or abandoned; it should be given—
   - *a*. During the shivering, No. 5. if the first period should have been neglected; then
   - *b*. Place on the animal the leather blister as remarked in No. 4, and in case it should not draw—
   - *c*. Two blistering plaisters or vesicatories on the tender skin in the inside of the hind legs; see Vol. VI.
   - *d*. Still more efficacious is the burning with a hot iron the spot where the leather is set.

   During this period the animal refuses all forage and drink. Milk cows lose their milk, and those with young throw their calves. The dung is dry and the evacuation, as likewise the urine, is attended with pain. The eyes are dim and begin to run, as also the nostril. The teeth are now compressed and the breath is of ill odour.

   The animal shows evidence of great pain. Animals killed in this state give proof in the entrails of disease. The gall-bladder is larger than in the natural state. The gall itself is dissolved and has a bad smell.

The course of the disease.

However bad the disease may yet have been, it now proves worse, and in addition to the afore-named symptoms there are the following fresh ones:

- *a*. Malevolent croup or quinsey. The mites, so called dörrwurmer, become abscesses or ulcers, extend themselves over the tongue, in the mouth, and in the swallow. The breath of the animal thence becomes putrid, and swallowing very painful.
- *b*. Abscesses under the skin.
- *c*. Swelling of the hinder part of the stomach, with a rumbling noise; and lastly,
- *d*. A watery diarrhœa, often mixed with blood, very putrid.

  In this state the animal is past saving and dies on the 4th, 5th, or 6th day.

  Nevertheless, sometimes on the latter day the diarrhœa diminishes, an equal warmth extends over the whole body, and a considerable number of small abscesses appear on the skin of the animal. These are of good omen. The animal then lives over the 9th, and is well on the 12th. It is requisite, therefore, to assist nature in saving the animal, and for this purpose is given No. 7. as there prescribed.

  Weakening remedies, such as purging, bloodletting, &c., are of no avail, and only render the recovery hopeless. Consequently the following recipes are recommended.

Recipes.

No. 1.

Take of powdered roots—

Angelica and enzian	1 lb.
Rhubarb	1 lb.
Pure tartar	1½ lb.

of this mixture 2 spoonfuls or 2 ozs. are to be given daily in a maas Bavarian measure (2 pints English) of tepid water.

No. 2.

Take raw barley, a handful, boil it in a maas (2 pints) of water till it rises; strain it off, and add to it 4 lath (2 ozs. English) of alum, (or in want of that, kitchen salt and vinegar,) some spoonfuls of honey, for rinsing out the mouth.

No. 3.

Take asafœtida 3 lath (or 4 ozs. English), 4 lath (or 2 ozs.) of gum arabic or camphor, dissolved in spirits of wine; 2 maas (or 4 pints English) of vinegar (from wine); to be well shaken, and give from 8 to 16 spoonfuls every evening.

No. 4.

Take a handful of camomile or common milfoil, or any other bitter smelling herb and blossoms; for instance, wormwood, centaury, sage, &c.; pour into a maas (2 pints) of boiling water; let it stand a quarter of an hour in a covered vessel; strain it off, and add thereto a quarte (½ pint English) of (wine) vinegar. To give to the animal after the medicine.

No. 5.

Take of the infusion No. 4. 2 pints (maas), and add thereto and give from 2 to 4 spoonfuls of elderberry jelly (holdersulze, baobsambuci).

No. 6.

Take gum plaister (gummiplaster) as much as necessary; spread it on 2 pieces of linen, each piece 6 inches long and broad. Spread thereon Spanish fly powder, 2 drs. on each, so that the borders of the plaister are free. If the skin is raised, and the blister open, smear the open wound with butter, cover it with the given plaister, and wash it daily twice.

No. 7.

Take 3 lath (1½ ozs. English) of powdered quin-quina, or peruvian bark; pour on about half a maas (1 pint) of scalding water. When it has become tepid add to it ½ drachm of camphor, rubbed up with gum arabic, 1 quarte (½ pint) of Austrian wine. This mixture to be given every 6 hours. In the interval a linseed decoction or No. 4. without vinegar.

General Observations.

Since 1711 the Rinderpest has carried off, in Germany, more than 25,000,000 of cattle. On calculation 3 out of 4 die.

In Germany the Rinderpest has appeared in all seasons, is neither arrested by heat nor cold, spares neither young nor old, is dependent on no external circumstances, such as bad nourishment, damp, or noxious influence.

It is alone conveyed through infection and contagion, and is most easily conveyed.

The slaughter of the first animal infected is the best means of preventing the spread of the disease.

These animals are reimbursed; and the expenses attendant on the measures to be taken generally for the suppression of the disease are incurred in the first instance by the Kreis District or Circuit. (See Vol. XV. page 593.)

In 1813 fresh regulations were issued by the Bavarian Government. They will be found in Vol. XV. from page 593 to page 616.

They are mostly of the same nature as the foregoing, published in 1788, and do not afford any further knowledge as to the disease itself.

Regulations were further published, 9th July 1822, respecting another disease in cattle, called the milz-seuche or milz-brand (anthrax), a fatal distemper among cattle by which the milk turned into a black fluid.

The mode of treatment and the symptoms of this disease, which is completely distinct from the rinderpest, are given in Vol. XV. from page 617 to 624.

On the 9th June 1835 an ordonnance was published in Bavaria, stating that as the cattle disease, then raging in Austria, was the lungenseuche combined with the milzbrand and with the löser dörre (typhus bovum orientalis), or the rinderpest, the public are duly informed to apply the remedies for the former above referred to, published in 1822, and not those in 1813 against the rinderpest. See Vol. XV. page 651.

From page 654 Vol. XV. to page 691, for the information of the public, are published the regulations for the general prevention and suppression of the cattle disease by the King of Prussia, and dated Berlin, April the 2d, 1803.

Vol. XXX., page 193, contains the Report of the Veterinary College of Munich, addressed to the King of Bavaria, on the Rinderpest, which is deserving of notice; it is dated Munich, 10th November 1844.

Art. 363, § 2. of the Penal Code.

Whoever wilfully or unintentionally contravenes the prohibition of importation, the measures of repression, or control, and other preventive measures which have been ordered by direction of the head police, for protection against the entry, aggravation, spread, or return of contagious cattle diseases, and likewise publicly made known, or such regulations communicated to him personally by the proper local and district authorities, shall be punished by arrest or by fine up to the amount of 150 florins, and if in consequence of contravention foreign cattle should be seized by the disease, he shall be punished with imprisonment up to one year, or fined up to the amount of 400 florins.

Arts. 122 & 123 of the Police Penal Code.

Art. 122.—Whoever avoids, or does not in the right time submit sheep and other domestic animals to, the inspection ordered by the head police for the prevention of sheep-rot and other cattle diseases, shall be fined up to the sum of 10 florins.

Art. 123.—Whoever, after having perceived symptoms of a contagious disease in an animal belonging to him or in one intrusted to his care or charge, does not forthwith keep the animal at a distance from the places where the danger of the contagion of foreign animals exists, and does not give the local authorities notice thereof, or does not call in a veterinary surgeon authorized to practise for the treatment of the animal, shall be punished by a fine of up to 25 florins.

Should any symptoms of hydrophobia show themselves in an animal it must be killed immediately or rendered otherwise harmless, in default whereof the previous punishment is to be enforced.

Appendix I.

Hungary and Austria.—Information respecting the Rinderpest.

(*Transmitted by Lord Bloomfield.*)

My Lord, Vienna, 25th October 1865.

With reference to your Lordship's despatch, No. 100, circular of 9th instant, I have the honour to forward herewith a memorandum by Mr. Harriss respecting certain cattle diseases in Hungary, in which is enclosed a paper containing a detailed account of the Rinderpest, and of the epizootic forms of anthrax.

I have, &c.,

The Earl Russell. (Signed) Bloomfield.

Enclosure 1 *in preceding letter.*

Notes relating to Cattle Diseases in Hungary.

During a recent short visit to Pesth and Pressburg, I heard several opinions expressed respecting the two Cattle Plagues known in Hungary, namely, the so-called Rinderpest and the so-called Blood-plague (Blut-seuche). As these opinions were for the most part given by persons whose knowledge of the subject is of many years' standing, the following chief points in them may not be uninteresting.

The Rinderpest is also called the Blätter-dürre, which may be considered to mean a dryness of the "Blätter," or the "Blätter-mogen," the German word for the manyplies of a ruminant. This name may arise from the opinion generally held that the Rinderpest is essentially a disease of that organ, or rather that the Rinderpest begins by a diseased state of that organ, and that this diseased state causes all that follows. It is stated that the manyplies becomes unnaturally dry, and if after death the carcase be dissected, the food in that organ will be found in so dry a state as to crumble into dust. The real Rinderpest, being a disease of the manyplies, can only be a disease peculiar to ruminating animals. I understand that there have been instances in which it has attacked sheep, and also goats, in Hungary; but the black cattle have always been the most severely and by far the more frequently attacked. That the Rinderpest is introduced directly or indirectly from the neighbouring Empire of Russia seems to admit of no doubt, but whether or not it may be introduced by miasma, as well as contagion, seems an open question. In favour of the miasma theory it is asserted that there have occurred cases of a breaking out of the Rinderpest inexplicable by the theory of contagion merely. It is hep that a miasma may be wafted from the infected country into the hitherto healthy district, and that therefore, in spite of the strictest "cordon" system, the Rinderpest may break out in healthy places. In so far, therefore, as miasma may be a cause, the "cordon" system must be ineffectve. As to the contagiousness of the disease there seems to be little doubt; but I did not succeed in ascertaining, or rather in obtaining sufficiently exact information to indicate, how far this contagiousness may depend upon predisposing circumstances, and how far this so-called contagiousness may be due to the influence of miasma. It was however asserted, that the contagiousness is so great that with a straw from an infected stable half a dozen healthy stables could be infected. It would therefore seem that, though no "cordon" system or other precautions could prevent a breaking out of the Rinderpest from the influence

of miasma, yet such measures perfectly carried out might more or less prevent the spreading of the disease. In Hungary the "cordon" system is not implicitly and universally relied upon. Indeed there seems to be an idea that it would be better not to rely upon any such measures, but rather to adopt inoculation as a preventive. So far is this the case that an impression exists that such inoculation will be soon rendered obligatory by law. As far as I could learn, inoculation has been successfully tested by experiment. I mean that it has been so far tested that inoculated animals have in infected districts escaped the Plague. But time only can show whether the good effects of the inoculation are lifelong, or sufficiently lasting to warrant the necessary expenditure. There would of course be an additional, and comparatively rather large additional, expense incurred by the cattle owner. There would also be a probable mortality from inoculation of two or three per cent. But perfect immunity would be worth securing at even a greater cost in Hungary, which is so liable to attacks by the Rinderpest.

Arsenic, which has been in England mentioned as a remedy, or rather as a preventive against the Rinderpest, does not appear as far as I could learn to have been used in Hungary. The steam bath has been used successfully, but I did not obtain an exact idea of how far its use may have lessened the mortality. The Rinderpest is certainly not considered in Hungary to be incurable. The short time I passed in Pesth did not, however, admit of my obtaining the details of the various methods of cure that have been tried, or the statistics of the success or failure of any such experiments.

There is in Hungary another cattle disease, which is also looked upon as a plague, for it is frequently as fatal as the Rinderpest. It is called the Blood-plague, and in a milder form an inflammation of the spleen. This disease has attacked horses as well as cattle, and might, I presume, attack any animal; whereas the Rinderpest is from its very nature peculiar to ruminating animals. The horses, which are said to have recently died in England of Rinderpest, may have really died of this disease. In Hungary the Blood-plague, or a kindred form of disease, if it breaks out at all, breaks out after a more than usually hot and dry season, and if I am well informed it may even become fatally epizootic. The late season in England has been unusually hot and dry, and may consequently have there produced this disease. As inflammation of the spleen it is probably as well known in England as in Hungary. But it may be that the disease has assumed in England the more virulent form, already known in Hungary.

Arsenic appears to have been employed with some success in the cure of sheep, as a remedy, and as a preventive against the Blood-plague. It is therefore possible, in the case lately reported in the "Times" of the use of arsenic in Debreczin as a preventive against a plague which had broken out amongst horses, that the disease was really this Blood-plague or one of its kindred forms. A preventive that appears to be more relied upon is to make an entire change in the usual food of the animals, if they have been principally fed upon dry food, let them be fed upon green food, and so on. The Blood-plague is indigenous, and seems to be produced only by unfavourable seasons. However epizootic and fatal the disease may become, there appears to be some doubt as to its being very contagious, or even always contagious.

The enclosed paper is written by a Hungarian who is well known at Pesth as a practical agriculturist (œconom), and who has had in Hungary a long and large experience in the management of cattle and in the treatment of the Rinderpest.

The first portion of the paper is devoted to an examination of the disease anthrax, and to its various kinds, of which the epizootic forms may become veritable plagues; one of these forms is the so-called Blood-plague previously mentioned.

As regards horses, the symptoms of anthrax are detailed at length, and its indications on dissection are also stated. The causes of the disease (as far as they appear to be known), and the cases in which it may become contagious, are mentioned. And lastly, the treatment that has been advantageous, and the precautionary and preventive measures that may be usefully taken, are stated in detail.

As regards cattle and sheep a corresponding account of anthrax is given, and in conclusion the varieties of the disease are separately described, and their treatment, and the necessary precautionary and preventive measures are set forth at length.

With respect to the Rinderpest, it is stated that the disease is peculiar to ruminating animals, is contagious, and is not indigenous in Hungary; and it is further stated that the Rinderpest can only attack the same animal once in its life. The earliest symptoms (which appear from the fourth to the eighth day of incubation) and the subsequent symptoms are very fully described. The chief and most reliable indications of the disease on dissection are next given. The various media of infection are enumerated. And lastly, an advantageous method of treatment and the use of inoculation as a preventive measure are fully described.

I may add, that I have not described the use of the steam bath, as the method employed in Hungary corresponds to the method already known in England, of digging a pit, employing a large steam kettle, and so arranging everything that the animal shall be thoroughly steamed without injury to the respiration, and without subsequently taking cold.

Vienna, October 25, 1865. J. P. Harriss.

Extract from Enclosure 2.

Translation furnished by Home Office.

Cattle Plague (Löserdürre, Übergalle).

A febrile contagious malady, peculiar to all ruminants, as *cattle, sheep, goats,* and *deer,* which does not attack the same animal more than once in its life, which is not developed with us originally, but is always introduced from some neighbouring country on the east. When once introduced the malady spreads by means of a very active [intensive] contagious matter, of which ruminants of every race, age, sex, constitution, &c. are susceptible, either directly or indirectly; it lasts a long time, and by the enormous losses attendant upon it gives rise to a universal distress throughout the country, as the Austrian States at various times, and even recently, have but too abundantly experienced.

Symptoms. After infection has taken place an interval of from four to eight days occurs, during which the animals are apparently perfectly well. The sick beast shows the first striking signs of malady by a change in its manner; most commonly it is seen to be remarkably heavy and dull; it hangs its head, lowers its ears, stays behind the herd, and when in the stable keeps away from the crib. Another animal will be excited, uneasy, shaking its head, stamping with its feet, lowing frequently, butting with its horns, and running away from the herd; if tied up in the stable it tears away from the chain and rope, and continually endeavours to go elsewhere. Any one looking more attentively at the animal may perceive now and then trembling motions of the head and neck; the hairs bristle up, especially on the back and towards the shoulders; the insertion of the horns and ears are sometimes cold,—sometimes warm; the palate [flotzmaul] is dry; the eyes shining; the mucous membrane of the nose is redder than usual, red spots appear on that of the mouth; with these signs the animal loses its appetite, or looks for food rarely. At the same time rumination either ceases entirely or only takes place irregularly; the dropping of the dung is delayed, and it is of a dark colour, sometimes covered with slime on the surface; and many animals show signs of bellyache, by frequently looking round towards the tail and bending up its back. The breath now becomes more short and quick, joined with a striking motion of the flanks, and loud groans, and sometimes a short and dry cough supervenes, which is the cause of much uneasiness to the animal.

After these symptoms have continued for some days an increased separation commences in the mucous membranes of the eyes, nose, and mouth, and the eyes in consequence overflow with viscid, slimy tears; an abundant yellow or bloody stringy discharge comes from the nostrils, which gradually becomes white and fetid, and a tough viscid slime also flows from the corners of the mouth, and at the same time there are found on the mucous membrane of the mouth, especially between the under lip and the gums, small blisters, which often cover the whole inside of the mouth; the sick beast grinds its teeth, which are very loose. The dung now becomes soft and pappy, and at length liquid, and not unfrequently coloured with blood; it is usually dropped with effort, in small quantity, frequently repeated. The general weakness and leanness makes rapid progress, the eyes sink in, the sight is weak, air-tumours rise on the back under the skin, groans and difficulty of breath become continually more violent, the ichorous discharge from the open fundament flows involuntarily, and finally the beast cannot stand any longer on its legs, but lies on its side, with the head turned, until at once, generally between the fifth and ninth day, in very bad cases between the third and fourth, death comes on with convulsions, and puts an end to its sufferings.

When the malady takes a favourable turn the attacks are more moderate in degree, and they gradually subside; the skin becomes warm, and remains so; appetite and rumination return; the looseness diminishes, and by degrees the

dung recovers its normal condition; the emaciated animals soon get well, and recover their former liveliness. In convalescence a scabby eruption very often appears on the skin, accompanied by itching, especially on the nape of the neck or the sides of the neck, and on the back. Cows with calf generally miscarry; but after that they very frequently recover.

As the knowledge of the Cattle Plague, acquired from the symptoms during life, chiefly at the commencement of the epidemic, is not quite positive, it is of the utmost importance, for the advancement of that knowledge, to examine those sick beasts that have died or have been killed, and therefore the most essential appearances after death are here noted down as follows:—

On looking at the outside of the carcase the hair is seen bristly; a whitish slime appears at the corners of the eye and at the nostrils, partly dried to a bark; the hind-quarters are much swollen; the mucous membrane of the intestines, projecting through the fundament, is of a bluish-red colour; the tail and buttocks are dirty with excrement. On opening the body much air comes forth, which diffuses a bad smell. The first two divisions of the stomach are more or less filled with crude sour-smelling food, and their membranes are friable and infiltrated, and blood-spotted here and there. The third stomach is usually full to swelling, and sometimes distended to a considerable size; also it is sometimes firm and sometimes soft to the touch, and in accordance therewith the contents are sometimes solid and dry, often so much so as to be capable of rubbing to powder, in cake-shaped layers squeezed together between the compartments, and sometimes damp, pappy fodder; in the former case the mucous membranes lining the walls of the stomach appear in places ragged and loose, and sticking to the fodder; in the latter case the mucous membrane is very much softened, and the surface skin easily removable. The rennet stomach [laabmagen] and the thin guts [dünn-darm] always exhibit the most striking change; on the outer surface they are more or less discoloured, covered with livid spots and bare places, and when cut up the mucous membrane appears dark red, and covered with a tough, adhesive, slimy fluid, discoloured, frequently of a greyish black. The whole canal of the intestines is more or less filled with fœtid gases; the liver is generally friable, and of a clay yellow; the gall-bladder is much distended with thin yellowish green gall. The spleen is generally unchanged; the lungs appear shrivelled, pale, or discoloured, and sometimes much swollen; the branches of the wind-pipe are filled with a purulent frothy liquid.

The *propagation* of the Cattle Plague with us takes place, as above stated, only by the conveyance [verschleppung] of infectious matter [contagium]. This contagium is developed in every animal infected with the Cattle Plague in the beginning of the malady, and it continues during the whole course of it. It is of its nature partly volatile, partly fixed, and it adheres to the expired air, to the vapour of the blood, to the transpiration of the skin, as also to all the fluids and remains [ueberreste] of the diseased animals, as also to all articles that have been in contact therewith. The contagium is likewise operative to a considerable distance and when largely diluted, and for this reason it is easily spread by currents of air and by media of every kind. The malady once settled in a district is consequently extended further and further, through the intercourse between the inhabitants of infected villages and those uninfected, through butchers, tanners, quack doctors, &c., by giving food or drink which has been touched by infected cattle, by the free wandering about of domestic cattle, or by numerous other circumstances which are often difficult to be traced. The shortening of the duration of the epidemic is therefore especially dependent on the strictest possible carrying out of the veterinary police measures directed to combating the epidemic, and to the entire extirpation of the pestilential matter.

Even the *curative treatment* is subordinate to this object, and it can be taken into account only so far as those measures of themselves alone are not sufficient to set a barrier to the entrance of the malady into a given district, together with the condition that no further infection can proceed from the sick beasts under treatment.

In regard to curative treatment, it is practically demonstrated that not one of the remedies recommended sometimes as specifics by the allopathists has ever done anything of importance in the majority of cases, nor has homœopathy led to the discovery of any specific. Although the malady as a principle exhibits itself pretty constantly as a process of exsudation on the mucous membranes of the alimentary ducts and the air vessels, yet it offers many differences in regard to symptoms and to its details, which would require in any given case that the choice of the remedy to be employed should be modified. In the cattle disease which prevailed rather extensively in a part of Hungary in 1855 and a part of the following year, a very satisfactory result was obtained with sick cattle of strong constitution by the following treatment:—

In the commencement of the malady, where, soon after the appearance of fever, pain in the hind quarters, hurried breath, dry cough, and a retarded discharge of hard and dry fæces, were present, four to eight drops of the essence of bryonia were exhibited, and repeated at intervals of two to four hours, and with this a striking improvement was experienced in the majority of cases, after 24 to 48 hours. When especial excitement and restlessness were present, the treatment was changed to doses of belladonna, with a similar good result. Phosphorus to the sixth degree of dilution has shown itself salutary in cases where the breathing was not only much hurried but also very difficult, and attended with frequent painful coughing, sighing, and moaning, and at the same time an abundant yellow or blood-streaked tenacious discharge had taken place from the nostrils. When in the further course of the malady the peculiar diarrhetic scouring supervened, when, with raised up back, a very fœtid cinnamon brown liquid excrement, mixed with slime and blood, was dropped with much effort, then sometimes hellebor. nigr., sometimes mercur. sublimat. corrosiv. in the sixth dilution, has been found salutary. Acid muriat., which has been applied with very favourable results in another epizootic, has led to nothing this time. The arsen., also recommended by Gunther, was of no use. A remedy worth notice is solanin. According to a private communication it was said to be used in another comitat in 1850, as well by itself as alternately with arsen., with very favourable results.

In *regard to dietetics** it is requisite to put the sick beasts in moderately warm stables, not windy, but admitting of ventilation; they may be in sheds partly open in the summer; they should be rubbed frequently, and likewise covered in case of its being necessary, and they should be always supplied with fresh water to drink, not too cold. The accumulation of many sick animals in one stable has always been found to have a very injurious influence on the continuance of the malady. If, during the improvement in health the appetite returns, it may be at once gratified with only small portions of easily digestible food; in the season of pasturage the pasture will do its part without further care.

As a *preservative* means against the ravages of the Plague, the inoculation with the Rinderpest *contagium* has been several times proposed and carried out.

In 1861 and 1862 the inoculation with Cattle Plague contagium produced several successful results in the neighbourhood of Pesth. The inoculation of the cattle was effected by scraping with a sharp knife first the inner soft surface of the skin of the left fore foot, and then that of the ear, until the places were very red and hot, but without drawing blood. These surfaces, amounting to one or two square inches, according to the age of the animal, were then rubbed well in with the lymph gathered from *convalescent* beasts, in which a rag was dipped. The mucous discharge from the mouth, the nostrils, and the corners of the eyes, mixed together in equal parts, was employed as lymph. It was gathered with a pewter (blechern) spoon, and brought in well secured phials hermetically sealed, each of which was marked with the name or number of the animal from which it was taken. This was done with ten animals, and the glasses were then deposited in a cool place. Then out of these ten bottles those were chosen that had come from convalescent beasts which had already so far got over the malady that appetite and rumination had returned, and it was from the lymph of these only that the yet healthy cattle were inoculated. All the rest of the lymph was destroyed, and buried deep with the vessels.

Experience showed that such lymph hermetically sealed would remain fit for use from 40 to 60 days at the utmost.

(Signed) JAMES EGAN.

Pesth, 22d October 1865.

MY LORD, Vienna, 26th October 1865.

WITH reference to your Lordship's despatch, No. 100 circular of the 9th instant, I have the honour to state to your Lordship that on the 16th instant I requested Count Mensdorff to be good enough to furnish me with any information the Imperial Government might possess respecting the Rinderpest and other epizootic diseases, and particularly with regard to any new method of treatment or of precaution and prevention that may have been adopted in Austria.

I have also the honour to enclose, in copy and translation, by Mr. Harriss, a note in reply from the Ministry for Foreign Affairs, from which it appears that the Rinderpest

* The Germans use the word in the sense of hygiene generally, not food only—Tr.

has nearly died out in Austria, and in which the further information desired by Her Majesty's Government is promised on a future occasion.

I have, &c.

The Earl Russell. (Signed) BLOOMFIELD.

Enclosure 1 *in preceding letter.*

[Translation.]

In reply to the esteemed note of the 16th instant, a copy of a communication from the Department of the Interior, dated the 3d instant, respecting the Cattle Plague in the imperial territories under the control of that central office, is herewith transmitted to his Excellency Lord Bloomfield, with the additional remark that the Cattle Plague has entirely died out in the provinces on the other side of the Leitha, according to reports that have been received from the competent authorities, and that it only appeared in August in the village (gemeinde) Mikosfalu of the district (comitat) Wieselberg, where also it disappeared on the 25th of the same month.

Whilst reserving to himself the opportunity of making a further communication to his Excellency respecting any new methods employed against that plague in this country, and also respecting any preventive measures, the undersigned avails himself, &c.

For the Minister of Foreign Affairs,
(Signed) MEYSENBUG,
Under-Secretary.

Vienna, 23d October 1865.

Enclosure 2.

[Translation.]

COPY of a NOTE of the DEPARTMENT of the INTERIOR to the MINISTRY for FOREIGN AFFAIRS, dated Vienna, 3d October 1865.

With respect to the esteemed note of 25th September last, the Minister has the honour to communicate that amongst the provinces under its control the Rinderpest rages only in the eastern part of Galicia, in eleven places of the district (kreis) of Zolkiew, in six of Lezezann, and in two in each of the districts (kreis) called Czorskow, Lemberg, Zarnoyol, and Przemzsl, and in one place of the district of Zlozow. Out of 11,977 head of cattle, and 1,667 diseased cattle, there are now, after the slaughtering usual in cases of such outbreaks, only 88 diseased cattle in 16 places, and no diseased animal at all in the other above-mentioned places, and these latter, therefore, are now passing through the prescribed period of 21 days' quarantine (observation).

In Lower Austria there were two cases of Rinderpest at the beginning of last month amongst imported cattle from Hungary. The two diseased animals, and the other cattle on the infected premises, were slaughtered, and no further case has occurred, and consequently, after the lapse of the 21 days' quarantine, Lower Austria has been declared free from Cattle Plague.

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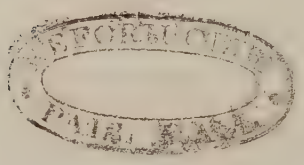

THIRD REPORT

OF

THE COMMISSIONERS

APPOINTED TO INQUIRE

INTO

REFORM CLUB
PALL MALL

THE ORIGIN AND NATURE, &c.

OF

THE CATTLE PLAGUE;

WITH

AN APPENDIX.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1866.

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REPORT - - - - - - - - - - - - iii

APPENDIX - - - - - - - - - - - - 1

THIRD REPORT

REFORM
PALL MALL

OF

The COMMISSIONERS appointed to inquire into the ORIGIN and NATURE, &c. of the CATTLE PLAGUE.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

IN our Second Report submitted to Your Majesty, we stated that we had requested several gentlemen, eminent in medicine and chemistry, * to investigate the Cattle Plague from some special points of view. The reports which we have received from them we now lay before Your Majesty as a part of the Appendix to this our Third and final Report. In doing so, we desire first to express our obligations to them for their work, undertaken at the shortest notice and performed under the disadvantage of having a very limited time allowed for it; and further, to record our sense of the valuable additions which they have made to the stock of knowledge which previously existed respecting the disease. In these acknowledgments we include the Edinburgh Cattle Plague Committee, who have furnished us with a valuable paper embodying the result of their inquiries.†

Some of these investigations might with advantage be pursued further, in directions pointed out by the reporters themselves. We recommend these suggestions to the consideration of Your Majesty's Government.

In our own present Report we shall avoid entering into discussions on doubtful points, and shall content ourselves with marking out, as briefly and plainly as we can, such of the results arrived at by observation and experiment as we deem most important, and arranging them in what seems to us the most convenient order. Thus we shall consider, first, the symptoms and course of the disease, and the nature of it, as deduced from those symptoms. We shall then proceed to the question, how and whence it originated; and shall afterwards pass on to the means of prevention and cure, and the precautions which should be taken in order to prevent future outbreaks of it.

The preparation of this Report has, from its nature, devolved mainly on the medical members of the Commission, and their colleagues necessarily rely on them for the soundness of the views expressed in it on questions of medicine, chemistry, and physiology.

1. *Symptoms and Course of the Disease.*

We were anxious to ascertain, in the first place, what are the earliest signs which can be relied on as indicating the existence of the disease. As to this point, the inquiries set on foot in this country, first by Professor Gamgee and then by Dr. Sanderson,

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* The names of the gentlemen who undertook these inquiries, and the subjects of their investigations, are—
Nature, propagation, progress, and symptoms of the disease; J. B. Sanderson, M.D.
General pathology of the disease, and its relation to human diseases; C. Murchison, M.D.
Chemical pathology of the disease; W. Marcet, M.D., F.R.S.
Morbid anatomy of the disease; J. S. Bristowe, M.D.
Microscopical researches on the disease; L. S. Beale, M.D., F.R.S.
Treatment; George Varnell, M.R.C.V.S., and William Pritchard, M.R.C.V.S.
Disinfection; R. Angus Smith, Ph. D., F.R.S., and W. Crookes, F.R.S.

† This Committee consisted of the following gentlemen:—
Professor Dick, V.S.; James A. Hunter, M.D.; Henry J. Littlejohn, M.D.; Professor Douglas Maclagan, M.D.; Dr. Lyon Playfair, C.B., F.R.S.; C. S. Romanis, V.S.; Sir James Y. Simpson, Bart., M.D.; Professor Strangeways, V.S.; Professor John Wilson; ANDREW WOOD, M.D., Chairman.

establish this fact, that a rise of temperature precedes any other symptom. Within a period ranging from 36 to 48 hours after an animal has taken the Cattle Plague by inoculation the natural temperature rises from 102° Fahr., or a little above, to 104° or even to 105½°. This occurs at a time when the animal appears to be in no way ill. It follows therefore that the length of the incubative period, that is, of the time when the disease is hatching in the body, is less than was supposed. The disease can be detected at least two days earlier than has been hitherto believed, and the duration assigned to the incubative period must be reduced by that time.

This discovery has practical importance. It may and ought to lead to an earlier separation of sick from sound animals, and may also render it possible to shorten the period of quarantine.

Two days after the perceptible rise of temperature has begun, the next sign occurs, namely, a peculiar condition of, or eruption on, the lining membrane of the mouth. It resembles at first sight the appearance in the foot and mouth disease, but can readily be distinguished from it by a practised eye. Dr. Sanderson has found it in every case (80 in all) seen by him, and in every instance he has been able to recognize the disease from this sign alone. It has been stated, however, that in rare instances it has been absent. Almost simultaneously there occurs a very distinctive appearance on the mucous membrane of the vagina. It appears that one or other of these signs is very rarely absent; so that when they are taken in connection with the elevation of temperature, the diagnosis of the disease can be made with certainty.

On the day following the appearance of the eruption, or about 72 hours after the first elevation of temperature, the animal may be observed to be a little ill, to have less appetite than usual, and to ruminate irregularly. Even at this time, however, the pulse may be unaltered. On the following day, the fourth from the first rise of the temperature, the animal for the first time shows marked symptoms of illness, and this period, which may be 110 hours after the real commencement, is usually considered by superficial observers as the beginning of the disease.

The seriousness of this oversight is obvious, not only on account of the great importance of the earliest possible separation and isolation, but in regard to treatment. The very earliest recognition of the disease is essential, if a remedy is to be discovered, for it is within the first four days that any remedy is most likely to be efficacious.

After the fourth day is over the constitution is thoroughly invaded. Then ensue the urgent symptoms,—the drooping head, the hanging ears, the distressed look, the failing pulse, the oppressed breathing, the discharge from the eyes, nose, and mouth, the eruption of the skin, the fœtid breath, and the other well-known signs of the disease.

During the sixth day there occurs a great diminution of the contractile force of the heart and voluntary muscles, the pulse becomes very feeble and thready, the respiratory movements are modified, and the animal sometimes shows such weakness in the limbs, that it has even been thought that some special paralytic affection of the spinal nerves must exist. The temperature now rapidly falls, and signs of a great diminution in the normal chemical changes in the body appear.

Death usually occurs on the following or seventh day from the first perceptible elevation of temperature.

Although this is given as the typical course of the disease, there are great deviations from it, as some animals live a longer, many a much shorter time, and the severity and sequence of the symptoms vary considerably.

The causes leading to these symptoms, or, in other words, the reasons why these alterations from health occur, may be thus stated. A peculiar agent causes first of all a morbid state of the blood. Coincident with the first elevation of temperature, and, of course, long before there is the least outward appearance of ill-health, the blood of an animal which has taken the Cattle Plague contains an agent which can produce the plague in another animal. In other words, the earliest fact which can be made out after infection is, that the blood contains the poison of the disease, so that serum obtained from it will give the disease by inoculation. This fact, ascertained by Dr. Sanderson, is the most important pathological discovery yet made in Cattle Plague. It is pregnant with consequences in medical doctrine, for though the existence of a similar fact has been long suspected in several human diseases, it has never been proved in any. So material, indeed, is it that we must dwell on it for a moment. The poison contained in a minute portion of the mucous discharge from the eyes and mouth of an animal ill with Cattle Plague, if placed in the blood of a healthy animal increases so fast that in less than 48 hours, perhaps in a far shorter time, the whole mass of blood, weighing many pounds, is infected, and every small particle of that blood contains enough poison to give the disease to another animal. This at once accounts for the rapid spread of the Cattle

Plague. The agent is multiplied to a large amount in a very short space of time. How soon after the poison is put into the blood the animal becomes capable of giving the disease by natural infection to other animals, is not determined; possibly not until those parts of the body which can give off products to the air become impregnated with the poison. At what time the blood and the textures cease to be able to give the disease, is also not determined; nor, when the poison mixed with mucus or with serum is exposed to the air, can a definite time be named when its energy is destroyed.*

As far as we can judge, the elevation of temperature, or (to use the usual medical term) the fever, begins when the poison has infected the whole mass of blood, *i.e.*, within from about 40 to 60 hours after its first entrance into the system. At the same time the chemical changes in the body are augmented and one of the ultimate products of disintegrated tissue, urea, is, according to Dr. Marcet, largely increased in amount. Soon afterwards (the time cannot be stated with precision), the blood is otherwise altered, the amount of fibrine is largely increased, the amount of water is lessened, and possibly the physical condition of the albumen may be altered, if we may judge from the change which Dr. Marcet observes in the diffusibility of the albumen of the muscles. According to Dr. Beale, the proportion of soluble substances is also largely increased.

The next phenomenon which can be observed is an alteration in the circulation. Almost everywhere, but more especially on the mucous surfaces and on the skin, there occur on the third or fourth day local congestions varying in size and intensity. In many places obstructions occur, and coagulations of blood in the capillaries; and in some cases the blood becomes quite stagnant.

A great increase of granular matter is found to take place both within, and outside of, the vessels of the affected parts. The capillary vessels themselves are greatly enlarged, and the spaces between them lessened or even obliterated. At the same time a considerable nutritive alteration goes on in the mucous membrane and skin, which leads to very rapid and imperfect growth of many of the cellular elements, and this is followed by a rapid disintegration and detachment in the form of discharges. As that portion of the mucous membrane which is most essential for the digestion of the food is most affected, the appetite soon fails, rumination ceases, and large accumulations of undigested fodder are met with in the first stomach. In many cases the villi of the small intestine are so destroyed that even if food were taken it would scarcely be absorbed in sufficient quantity to maintain life, and hence the rapid exhaustion, failure of the heart's action, depression of the animal heat, and general sinking of the powers. In some cases, when the process is more superficial, the membrane recovers its former structure, and that rapidly, and it is curious to find that one affected part may be healing while another is just beginning to suffer.

When, as sometimes happens, the mucous membrane most affected by the congestion is that of the lungs, the phenomena are not less severe; indeed the disease is sometimes even more quickly fatal. A slight cough is soon followed by accelerated breathing, which rapidly increases; and not unfrequently the difficulty becomes so great that some of the air vesicles are broken, and the air passes into the cellular tissue between the lobules, and from this it reaches even the subcutaneous textures of the back. This is believed by Dr. Bristowe and Dr. Sanderson to be the cause of the emphysema which they fully describe.

Reviewing this train of symptoms, it appears that the amount of fever, that is, the extent of the rise of temperature, does not constitute the danger of the disease; in some of Dr. Sanderson's cases the temperature was higher in beasts which recovered than in others which died. The true measure of the danger should rather, it seems, be sought in the changes in the nutrition of the digestive or respiratory mucous membranes, or in the failure in muscular contractility. This latter condition is itself probably in part a consequence of the former, though whether it is entirely so we are not prepared to say.

The Russian pathologist, Ravitsch, has already described with great accuracy some of these congestive phenomena, and his observations are fully confirmed and extended in the reports of Dr. Bristowe, Dr. Beale, Dr. Sanderson, and Dr. Murchison.

The immediate cause of these violent congestions, and of the consequent obstructions of the capillary circulation, which really constitute the great danger of the disease, is still unascertained. The explanation which Dr. Beale gives† is, that the poison itself consists of extremely minute particles of living matter, which multiply in the blood, and

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* When carefully protected the mucous discharges have occasionally retained their power of giving the disease by inoculation for no less a time than eleven months, according to Professor Jessen of Dorpat. Ravitsch also has kept the poison for seven months.

† Dr. Beale's Report, Appendix A., p. 152.

cause local capillary obstruction, which passes on into complete stagnation. In consequence of the impeded circulation, an increased proportion of soluble nutrient matter permeates the vascular walls, and gains access to the nuclei of the vessels and adjacent tissues, which increase much in size. This change is associated with, and causes, the rise of temperature which occurs at this period of the disease.

If regarded from a chemical point of view, it appears probable that this immediate cause resides in an increased zymotic action in the blood and in the textures, whence increased temperature, accelerated circulation, more rapid growth, congestion, obstruction, and disintegration ensue.

Whatever may be the cause of these very general congestions and nutritive alterations, the remarkable fact obtains that poison is present in the discharges from the mucous membrane, and hence at this period the beast is most highly infectious. The matter runs down the hide to the floor or woodwork, and when dry may be carried as dust in the air, and infect other beasts when received on the absorbing surfaces of the eyes, nose, mouth, lungs, or stomach.

2. *Nature of the Disease.*

Since it is certain that the cause of the disease is actually contained in the mucous discharges, and in the blood, and probably in the textures, of a beast ill with Cattle Plague, inasmuch as a healthy animal can be inoculated with these substances at any time, and the poison can, as experience shows, be carried, if need be, hundreds of miles in portions of these substances, it might be supposed that there would be no difficulty in separating and demonstrating the virus itself.

Dr. Beale has examined portions of infected blood textures and mucous discharges with the highest magnifying powers that exist, namely, $\frac{1}{50}$th of an inch focal adjustment. This magnifies 2,800 diameters; or,—to express the magnifying power by some examples,—an inch would appear to extend over 111 yards, and a child three feet tall would look as high as Mont Blanc. With such power, particles of even $\frac{1}{100000}$th of an inch in diameter, having any distinct character, would not be passed over. But he has found no definitely formed substance that can certainly be said to be the cause of the Cattle Plague. He finds a great increase of granular matter, but no new appearance decidedly characteristic of the disease. Possibly this granular matter may be the poison; possibly again it may exist in particles of definite form, and of a size still smaller than $\frac{1}{100000}$th of an inch, but which might be perceived if it were possible to construct instruments of still higher magnifying powers; more probably it is matter of a kind which is and will always be undiscoverable by the microscope. The peculiar entozoon-like bodies (Rainey's corpuscles) which are found so frequently in the muscles of animals dead with Cattle Plague, are not peculiar to this disease, and may be absent in it. They cannot therefore be the poison.

As the microscope fails us, we turn to chemistry to detect the substance, but chemistry has not hitherto separated the poison, and no chemical test as yet exists by which it can be recognized. An examination of the air vitiated by the disease is described in the report of Dr. Angus Smith. Chemistry has as yet found in Cattle Plague no complex albuminoid matter in a state of rapid chemical change capable of communicating its own action to the albumen of the serum of the blood and of the textures of cattle.

Hence it is only by its effects on the living body that the poison can be identified. In this it resembles other animal poisons which affect animals and man.* From the modes of increase and of action of these animal poisons a comparison has been drawn between the diseases they produce and fermentations. But, as Dr. Angus Smith's report shows, the chemistry of the various kinds of fermentation is at present in a state of great uncertainty, and the different views of Liebig and Pasteur still offer questions for discussion. The action which takes place in these diseases may be very different from that of any ordinary fermentation.

Whatever be the nature of the action, the poison certainly requires a peculiar condition in the body before it can act; thus it can multiply in the body of a bovine animal, or of a sheep, goat, deer, or gazelle, whilst we have no satisfactory proof that it is communicable to non-ruminants.

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* The word poison, as applied to the cause of Cattle Plague, is used in the general medical meaning. Unlike a chemical, corrosive, or irritant poison, it requires a second condition to be present, for it does not act unless certain favouring conditions also exist. The terms "germ" or "growth" are used because no better expressions can be found. They seem to imply an independent living existence of the poison, and on this point our knowledge is not yet sufficiently definite. Care must be taken that the terms used do not lead to erroneous conclusions.

Where the poison can act it increases rapidly, and causes a disease similar to that in the animal from which it was taken, whereas if placed in the body of a man, horse, or dog, it produces no such effect. It follows that in the first-named animals there is some special condition or aptitude wanting in the others.

But even in different species of animals, all of which are susceptible, the internal conditions are evidently not quite similar. The sheep and goat take the disease less easily than the ox. The disease also is in general less virulent, the symptoms and the post-mortem appearances being slighter, and the mortality less.

Further, the virus, in passing through the body of an animal, usually renders it insusceptible of another attack. In all these respects this poison resembles several other animal poisons.

If we desire to place the Cattle Plague in some recognized class of diseases, we must range it under the zymotic class, as formed by Dr. Farr. The maladies to which it has the closest alliance are the so-called exanthematous or eruptive fevers: its relation to the different members of this order will be found fully discussed in Dr. Murchison's and Dr. Bristowe's reports.

3. *Origin and Propagation of the Disease.*

To answer the question, what should be done to limit the progress of the disease, or to prevent its return, we ought to know how it originated here, and the conditions of its propagation.

If, for example, the Cattle Plague has spontaneously originated in this country from the way in which our cattle have been housed or fed, we might hope to show how such conditions act, and how they can be removed. If it originates in some wave of poisonous air which spreads over the country, and, after having a regular period of flow has a succeeding period of ebb and disappearance, we must be content with bearing what no care can foresee and no art control. If, however, Cattle Plague has been introduced among our herds by the arrival from infected places of cattle already diseased, and if it spreads entirely by contagion, it is obvious that means may be used, which, if applied strictly and carefully, will be effectual, to prevent its return.

We have been able to find no evidence of a spontaneous origin in England. The first known cases were all in animals collected from different parts of England and Holland, brought to the Metropolitan Market on one particular day, the 19th of June; they were purchased by different dairymen, and then taken to five sheds in different parts of London, namely, in Islington, Hackney, Lambeth, and Paddington. As there was no Cattle Plague in the parts of England whence these cattle came, and none in the sheds to which they were taken, and as the length of the incubation period, as well as the absence of any probable cause, negatives the idea of a spontaneous origination simultaneously in these five sheds, the conclusion becomes almost irresistible that the cattle must have caught the disease whilst standing for sale in the Metropolitan Market. Now this market is certainly the most likely place in England for Cattle Plague to be brought to from abroad, and if not the most unlikely, at any rate an unlikely place for it to spring up in.

It ought to be a matter of no surprise that we have been unable to indicate the precise channel by which the poison came into the market; from the universal ignorance of the signs of the disease at that time, and the probable slaughter of the affected animal soon after the market, evidence, which might have led to the detection of it at the time, would pass unnoticed and would soon be lost altogether. But, as we have since traced several introductions from the Continent, there can be little doubt that it was introduced in the same way in the first instance, and was overlooked. Moreover, in most places in England where the disease has broken out, its introduction can be traced. It follows the lines of cattle traffic, and does not arise spontaneously. In the cases where no explanation can be obtained, we consider it more likely that the evidence is insufficient than that the rule proved by a multiplicity of instances should have such exceptions. In confirmation of this, we find the Austrian and Prussian veterinary surgeons declare that, whatever may be the origin of the disease in other countries, it is always brought by diseased cattle to them.

The way in which the disease broke out and was destroyed in the Jardin d'Acclimatation in Paris, and over and over again in Aberdeenshire, its absence from Ireland, the manner in which it has spread in England and Scotland during the summer, autumn, and winter,—all these facts are conclusive evidence against the assumption of an occult atmospheric condition, and in favour of its spread by multiplication in the bodies of living animals.

It is an important question, to what distance the poison may be active when carried in the air. Professor Röll of Vienna speaks of its spreading round a sick animal for 20 or 30 paces, and of its being carried by currents of wind to a much greater distance, but the precise distance he does not undertake to determine. At the Royal Veterinary College on three occasions beasts kept about 20 yards from diseased animals did not suffer for three weeks. They were then moved into an infected shed and took the disease. On the other hand, at the Albert Veterinary College three animals kept 25 yards from some sick beasts took the disease; but then, although great care was taken to prevent carriage of infection, it is impossible to be quite sure that there was no direct transport. A distance of 100 or 200 yards in some cases appears to have given immunity, while in others beasts have been affected, and presumably through the air, at longer distances. Possibly it may drift under special circumstances, as in hollows or valleys, with an almost stagnant air, whereas in an open country, and with a rapidly moving air, it may be soon so much diluted and oxidised as to be innocuous. No distance can be specified as sufficient to ensure safety ; as a matter of prudence the greatest possible distance should be placed between sick and healthy beasts. Where the farms are small, and the homesteads near together, the disease spreads faster, as might be expected, than where they are scattered over a wider surface.

The influence of varieties of soil on the spread of the disease seems not to be marked, and there is no evidence that meteorological conditions produce a decided effect. In winter the increased crowding together of cattle may make the disease more fatal, whilst in summer the movement of animals may extend it more widely. Differences of elevation may be important. In Yorkshire, which was selected by Mr. Williams for examination in this respect as a large county with great varieties of surface, and where the plague had been severe, it appears to have adhered almost entirely to the low lands and the dales, and not a single outbreak is recorded at a height of 1,000 feet.* In several counties—Norfolk, Cheshire, Staffordshire, and Buckinghamshire—the disease has been observed to be more severe, if not more prevalent, in marshy and low-lying districts.

With regard to sanitary conditions, such as the amount of cubic space and ventilation in cattle sheds, the contamination of the air by the products of decomposing manure, and the supply of pure or impure water, the facts observed may be briefly thus summed up :—

There can be no doubt that overcrowding, or what is the same thing, deficient ventilation, and the custom of retaining the manure within or close to cattle sheds, cause the plague to spread faster and to be more fatal. The action is probably twofold: the poison is less diluted, so that animals receive it in larger quantities, and they are at the same time in a worse condition to withstand it. The supply of impure water also appears to increase the fatality, but we have not yet been able to satisfy ourselves that the virus is actually taken in with the drinking water, although such a mode of communication is not improbable.

Although important as influencing the spread of the poison when introduced, unfavourable sanitary conditions are subsidiary; they neither produce the poison, nor can the best sanitary condition be relied upon to exclude it. In some of the worst cowsheds in London the plague has not yet penetrated; in some of the best it has swept the stock entirely away.†

We adhere then to the opinion we formerly expressed, that the true mode of preventing the spread of the Cattle Plague is to treat it as an entirely contagious disease. We believe this expresses the whole truth; but if it be not so, if some other conditions, of which we know nothing, favour or restrict its spread, this does not remove our obligation to act on what is ascertained with certainty.

4. *Disinfection.*

Disinfection, in the sense in which the word is used here, implies the destruction of an animal poison, in whatever way it is accomplished. To find a perfect disinfectant for the Cattle Plague poison would be to stop the disease at once. We have naturally been very desirous of discovering a substance with such a power; but much more evidence is necessary before we can venture to affirm that success has been obtained.

* Report prepared by the Secretary of the Veterinary Department for the information of the Privy Council, p. 35.

† Although the evidence which has been placed before us shows that the condition of the London cowhouses has been very much improved of late years, chiefly by the exertions of the Metropolitan Officers of Health, it is yet certain that a better system of licensing ought to be adopted. Sanitary regulations are not uniform, are sometimes irregularly enforced, and can only be carried out by threatening opposition to the renewal of the licence. In all parts of the metropolis the keeper of a cowshed should be subjected to the same rules, and he should be called on to show, before he obtains his licence, that he is prepared to fulfil the rules. There is still much needed to be done in the way of securing a larger cubic space, more thorough ventilation and drainage, earlier removal of manure, and better supply of pure water.

In the first instance we requested Dr. Angus Smith to undertake this subject, with a view of seeing what chemical agent would be best suited for the purpose. Subsequently, at his suggestion, Mr. Crookes was asked to carry on various practical trials which might test the efficacy of two agents which Dr. Angus Smith had reported to us as likely to be useful.

We refer to the reports of these two gentlemen for an explanation of the present doctrines of infection, and an enumeration of the different substances which may be used to destroy the poison.

On examining these different agents it is soon found that the number of those which can be employed with advantage is limited.

Since the poison is constantly given off in discharges flowing from diseased surfaces, and since it may be suspended like impalpable dust in the air, it becomes necessary that any disinfectant should act continuously both on the discharges and on the air. No disinfectant can be efficacious if its action is intermittent, or if it does not act on both sources of danger.

It is evident indeed that the poison ought to be destroyed at the very moment of evolution or discharge. Every minute during which it remains active increases the danger. The disinfectant must therefore not only be both fixed and volatile, but so cheap and easily used as to be continually in action, and it must of course be innocuous to cattle and men.

A large number of substances which can be used in many other cases as disinfectants must be put aside, as not meeting these necessary conditions. Compounds of iron, zinc, lead, manganese, arsenic, sodium, lime, or charcoal powder, and many other substances, want the volatile disinfecting power; iodine, bromine, nitrous acid, and some other bodies are too dear, or are entirely volatile, or are injurious to the cattle.

On full consideration, it appears that the choice must lie between chlorine, ozone, sulphur, and the tar acids (carbolic and cresylic). Two of these bodies, viz., chlorine, in the shape of chloride of lime, and the tar acids, have the great advantage of being both liquid and aëriform; they can be at once added to discharges, and constantly diffused in the air.

All these four substances—chlorine, ozone, sulphurous acid, and the tar acids—have been practically tested, either in England or on the Continent, and there is considerable evidence that they all actually do destroy the Cattle Plague poison. Their precise mode of action is still uncertain. Chlorine and ozone act, no doubt, as powerful oxidisers, converting animal poisons into simple and innocuous substances. Sulphurous acid probably destroys the virus by its strong antiseptic powers. The tar acids, according to the experiments of Mr. Crookes, neither interrupt nor accelerate oxidation, but they act most powerfully in arresting all kinds of fermentative and putrefactive changes, and annihilate with the greatest certainty all the lower forms of life.

After a full consideration of the relative merits of the four disinfectants, and after some practical trials, Mr. Crookes arrived at the conclusion that the most powerful, and at the same time most simple, process of disinfection would be to use the tar acids as constant liquid and aëriform disinfectants, and sulphur in the form of sulphurous acid as an additional and occasional agency. In our First Report we recommended both these agents in a state of combination; the best mode of using them in a free state will be found detailed in Mr. Crookes's report, and in the Instructions which we furnished to Your Majesty's Government in February last, and which will be found in the Appendix.

The general result of experiments on disinfection with carbolic acid and sulphur is certainly very encouraging. For the details of these experiments, which have been careful and searching, we refer to Mr. Crookes's report. It is of course most desirable that no false hopes should be raised, for we have seen but too many instances in which a rude disappointment has utterly crushed what seemed reasonable expectations. But no one can peruse the account of what has been done without seeing that a fair case has been made out for a large and systematic trial of these measures. They must, however, be fairly tried; they must be used with perseverance and energy; not grudgingly or insufficiently, as has sometimes been the case, but with the determination to keep the disinfectant in presence of the poison everywhere and constantly, so that every particle of virus may be, without fail, subjected to its action.

For the reasons stated in Mr. Crookes's report, it appears that chloride of lime is inferior to the combined use of carbolic and sulphurous acids. But there is no doubt of the efficacy of this agent, and in certain circumstances, as for the washing of railway trucks, it may be employed in addition to boiling water or steam.

It is very desirable that the use of carbolic acid should become general throughout the country in uninfected as well as in infected districts. There is little doubt that even

were there no danger from Cattle Plague, the great purifying effect of this substance on the air of cattle sheds would contribute greatly to the health of the animals.

5. *Substitution of a milder Disease,—Inoculation and Vaccination.*

The substitution of a mild for a fatal disease, as of cowpox for human smallpox, has naturally been hoped for in Cattle Plague. It will be seen in the report of Dr. Sanderson, and appears also from experiments tried at the Royal Veterinary College, that the vaccine virus, whether taken direct from cows, or after passing through the human body, has no effect on Cattle Plague; and that human smallpox and the virus of the smallpox of sheep (variola ovina) have likewise no influence. The virus of Cattle Plague, after transmission through the bodies of sheep and goats, returned into the body of an ox, is found to have lost none of its intensity. Repeated transmission of the virus through cattle weakens its power, but in no very sensible degree. At present the vehicle of the poison, whether it be blood serum or mucous discharge, appears also to influence its action very little if at all, while mere dilution has no effect whatever. In fact, all attempts either to weaken the power of the Cattle Plague poison or to find another agent which might make the system of the ox insusceptible to it have entirely failed.

6. *Treatment.*

The Cattle Plague varies greatly in its severity and fatality. In some instances it has assumed a mild type, whilst in others it has killed ninety-five per cent. of the cattle attacked. No satisfactory explanation of this difference can be given. A consequence of it is, that the comparison of different modes of treatment in different places is thereby rendered exceedingly difficult.

Returns of the results of treatment in nearly 10,000 cases have been obtained, by means of circulars, by the officers of the Veterinary Department. Out of these it appears that the total proportion of reported recoveries, according to the tabular statement prepared by Mr. Williams, was 26·256 per cent., and that they were nearly the same under every kind of treatment.

Mode of Treatment.	Total Number treated that recovered or died.	Per-centage.	
		Recovered.	Died.
Antiphlogistic	958	27·453	72·547
Tonic and stimulant	2,301	25·858	74·142
Antiseptic	2,355	26·369	73·631
Special	1,173	25·831	74·169
Total	6,787	26·256	73·744

On these returns the Secretary observes :—

"The information conveyed by these returns must, however, be taken with great caution, as of the 9,708 "cases treated, after deducting those 'killed' and those 'remaining,' the average of those recovered "amounts to more than 26 per cent., a result which far exceeds the experience of independent authorities, "who have investigated the results of treatment both in cases under their own care, and also under the care "of the appointed inspectors. In attempting to reconcile this anomaly, it must be borne in mind that a "natural tendency exists to exaggerate, even unconsciously, the effects of a favourite system of treatment; "and further, that in the zeal for subjecting cases to treatment at the earliest moment, animals have often "been selected which are at the time free from the disease, and probably remain so for a considerable period, "in fact so long as to cause them to be returned as cases of recovery. These are not mere suggestions, but "statements based upon the results of numbers of modes of treatment which have been looked into by the "medical officers of this department. In nearly every instance where an investigation has taken place of a "method of treatment reported to be very successful, it has been found either that the animals had not been "suffering from the disease, that they were still labouring under it, or, if the visit occurred some time after "the reported recoveries, that they succumbed to the disease, with the usual per-centage of loss, at a "later period."

Little reliance, therefore, can be placed on the proportion of recoveries claimed by these returns. The material point is, that with the widest differences in the modes of treatment, there is hardly any difference in the alleged results; and the natural inference is, that the various drugs employed have produced little or no effect.

From the experiments on treatment undertaken at our desire by Professor Varnell and Mr. Pritchard of the Royal Veterinary College, no satisfactory results were obtained.

These experiments were necessarily conducted on a limited scale. To extend them more widely, or to test by actual trial one twentieth part of the multitude of suggestions which have been submitted to us—most of them, it must be added, merely conjectural and plainly valueless—would have required, not only a large expenditure of money, but a numerous staff of thoroughly competent veterinary surgeons, which neither was nor could have been placed at our disposal. No remedy can be pronounced successful until its actual operation has been accurately and repeatedly watched, or else until it is known to have been followed by uniformly favourable results in a very large number of cases. The area over which the disease has spread, and the interest which every stock-owner had in preserving his property, offered at the same time an ample guarantee that nothing which the ingenuity of practitioners could devise would be left unattempted; and it was certain that any remedy which achieved an apparent success would speedily become known, and would be widely, and therefore effectually tested.

The number of experiments made by different persons has in fact been very great; one drug after another has been recommended, declared infallible, doubted, and discarded, and the general result is such as has been deduced from the returns quoted above.

But, although, as respects the value of drugs, the evidence is merely negative, this is not the case as to diet. The information obtained by the Edinburgh Cattle Plague Committee shows that by judicious feeding with soft mashes of digestible food, the proportion of recoveries has been considerably and in some places very largely increased. This is consistent with the pathology of the disease. In fact out of 503 cases reported, 191 or nearly 38 per cent. recovered, and 312 or about 62 per cent. died. The result appears still more striking when the beasts are divided into two groups, according as they belonged to large or small stocks.

Large Stocks—30 to 80 Cows.			Small Stocks—under 30 Cows.		
Number.	Per-centage.		Number.	Per-centage.	
	Recovered.	Died.		Recovered.	Died.
303	22·2	77·8	200	62	38

Thus the favourable nature of the Scotch results is largely dependent on the smallness of the stocks. In small stocks fewer beasts are ill at once; hence there is less concentration of the poison. There is less crowding of the sick beasts; and, the supply of labour being always relatively greater in small herds, a sick beast receives much more nursing and careful feeding than in large ones.

The success represented by 38 per cent. of cures was in fact entirely owing to feeding, as appears from an analysis which the Edinburgh Committee have made of the dietary in 813 cases of Cattle Plague.

Kind of Dieting.	Number of Cattle.	Recoveries per Cent.
1. Cottagers' cattle, generally fed on mashed food - -	95	73·7
2. Larger stocks, where dry food was often given during convalescence - - - - - -	105	57·5
3. Cattle treated with mixed food of mashes and hay - -	303	22·2
4. Cattle fed with dry food, and treated medically with drugs -	310	13·5

The influence of a proper choice of food is here paramount; as to drugs, with the exception of some remedial means to treat urgent symptoms, and ammonia as a diffusible stimulant, the Edinburgh Committee do not recommend them.

If we could always reckon on 73·7 per cent. of recoveries the Cattle Plague would lose its terrors, but this cannot be anticipated as a general result. The number of cases indeed is far too small to serve as a safe basis of calculation.

It does not appear that any advantage is to be obtained by giving large quantities of stimulants.

In some districts a very considerable number of relapses have occurred. That is, animals apparently convalescent and which had commenced again to ruminate and to give good milk have then again become ill with some of the symptoms of Cattle Plague and have died. This has occurred four and even six weeks after the first attack. The cause

in almost all, if not in all, cases, is simply improper feeding,—dry and indigestible food has been given in too great quantity, and this has led to the fatal result.

It may be thought that the experience of this fatal winter has produced but small result, if this regulation of the diet is all that we can recommend. But the value is great of negative as well as of positive knowledge. There can be no question that powerful drugs of all kinds greatly heighten the mortality of Cattle Plague. It is an important step to recognize that strong medicines are of all others the most unsuited to this disease. Perfect cleanliness, ample ventilation, constant disinfection of the air and discharges by tar acids, and the most careful feeding with soft mashes of the most digestible food,—such and such only are the measures which our present experience sanctions for the treatment of the disease.

Although no drug has yet been of any use, it may be that this has arisen from the mode in which drugs have been employed. Dr. Sanderson's experiments have taught us that the only chance of cure by drugs will lie in stopping the development of the poison, and thus limiting the nutritive changes that cause the congestion. When the local congestions are set up in any great degree, the hope of doing good by drugs is passed. It is possible, we wish we could say it is probable, that by placing some agent in the blood at an early stage the morbid processes may be controlled or the growth of the poison stopped.

The sulphites and the tar acids have been thus used with the hope of arresting, the changes which are going on in the blood in the commencement of Cattle Plague. Hitherto, certainly, the experiments which have been made in this direction have produced no very favourable result ; but they are not sufficiently numerous to establish any certain conclusion. Mr. Crookes has injected diluted carbolic acid into the veins in considerable quantity; in one experiment as much as 105 grains. The animals did not suffer; and in two or three cases there was decided improvement, temporary or permanent. But the results were not decisive ; and it is probable that in several of the experiments the disease was too far advanced for a fair trial. He has also injected sulphite and bisulphite of soda into the blood of eight animals, in quantities of more than an ounce. In these cases, again, the disease was evidently three or four days old, which is probably too late for a successful trial. The treatment did no good.

Dr. Sanderson has also performed experiments with injections of bisulphite of soda into the veins. The result of his experiments is, however, not favourable to the employment of the sulphites. Four beasts were selected; two were treated by injection of one drachm of bisulphite of soda into the veins two or three times a day; one by injection into the veins, combined with administration of the bisulphite by the mouth ; one by the latter method only. In the first case one animal recovered ; but the next two cases ran their course as usual, and ended fatally at the usual time. The fourth case was a mild one, and the animal recovered. Dr. Sanderson is satisfied that the drug exercises no influence on the progress of the disease.

The plan of giving the sulphites by the mouth has been also tried by Professor Varnell without any good effect.*

Another disinfecting agent, chlorine, has been used as a remedy by Dr. Angus Smith and others. The result of Dr. Angus Smith's experiments was not favourable. The inhalation of oxygen gas was also tried by Dr. Angus Smith ; it seemed to relieve the difficulty of breathing, but otherwise was ineffectual. There was so much difficulty in giving the gas that he attempted to introduce it by giving the animals water charged with peroxide of hydrogen to drink. This also was useless.

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* Mr. Paton, Her Majesty's Consul at Ragusa, writing of the Cattle Plague in Dalmatia and the Herzegovina (18th October 1865), states that hyposulphite of soda is given as an antidote to the fermentation of the blood. Preparations of sulphur, mercury, and antimony are likewise administered as medicines. He observes, however, "The animals saved by medicines, or by the *vis medicatrix naturæ*, are not above five "per cent. of those attacked. We may therefore say, that medical science has not yet succeeded in finding "an antidote to this calamitous agent." In a subsequent despatch he adds, "The principal apothecary here, "a good practical chemist, whose interest it is to sell medicines, is of opinion that administering medicines "in the Cattle Disease is a mere throwing away of money, and that isolation, if the case is slight, and "slaughter, if the case is advanced, is the only effectual mode of dealing with it." In Moldavia, as we learn from Her Majesty's Vice-Consul at Jassy, the best authorities entertain the same conviction; and the general opinion in South Russia appears to be the same, though the German colonists attach some value to a mode of treatment described in a recent despatch from Mr. Grenville Murray (App. D.). In Holland the Minister of the Interior, in his report on the Cattle Plague, dated 18th November 1865, wrote as follows :—"No mode "of treatment has hitherto proved itself advantageous above any other. Veterinary practitioners seem to "have found the greatest benefit from mineral acids, from quinine, and from carbolic acid. A favourable "issue depends, according to them, in great measure on the care with which the beasts are tended, on "cleanliness, and fresh air."—*Rapport aan den Koning, Bijvoegsel tot de Nederlandsche Staats-courant van 22nd November* 1865.

The method of treating the disease by the injection of substances under the skin (called the hypodermic method) has been tried in many instances at the Royal Veterinary College, but without any satisfactory results. These substances included tincture of opium, tincture of assafœtida, and tincture of quassia.

Of the numerous plans of treatment which have been proposed during the course of the disease in this country some have enjoyed considerable reputation for a time. To one or two of these reference may be made.

Considerable success was claimed for a method of treatment applied at Mathenesse, near Schiedam, in South Holland, by two Belgian gentlemen, MM. Seutin and Gaudy; and, from the reports of the burgomaster of the place, coupled with the official returns weekly published for the whole of the Netherlands, we collect that the recoveries under their care exceeded the usual average. In the judgment, however, of the Dutch Government—a judgment stated to have been formed on a thorough and impartial scrutiny—the difference was slight, and the results at Mathenesse were not more favourable than those obtained by several of the native practitioners. MM. Seutin and Gaudy stayed a month at Mathenesse, and returned home about the 21st of October, the Government declining to treat for a renewal of their practice on the terms proposed by them. The subsequent returns from the commune show that, from that date until the end of January, when the disease disappeared, almost every animal which took it was at once slaughtered, instead of being subjected to treatment. Nor does the experience gained there appear to have led to the adoption of the system at other places.

M. Seutin's method is described as homœopathic, but "not rigidly" so,* and the reports of its success led to a trial of homœopathic treatment in England. Dr. Hamilton, an English homœopathic physician visited, for the purpose of informing himself on the subject, both Mathenesse and Brussels, where he had interviews with M. Seutin and his colleague, and an association was formed under the presidency of the Duke of Marlborough for trying the experiment here on an extended scale. Means for this were found in Norfolk, where all the cattle (45 in number) on several farms were placed under the charge of veterinary surgeons appointed by the association, and subjected to preventive and curative treatment. The result is stated in a report made to us by Veterinary Surgeon Mayer, Royal Engineer Train, whom we had instructed, with the concurrence of the Association, to watch the trial on the spot, and on whose accuracy and impartiality we could fully depend. Out of the forty-five, only one animal seems not to have contracted the disease; of the rest, four recovered and forty died. Homœopathy has, it appears, been since tried at other places; but we have had no opportunity of verifying the results said to have been obtained, and the information which has reached us has not been such as to encourage further inquiry.

The treatment suggested by Mr. Worms, which was at one time largely used, consisted in the administration of assafœtida, ginger, onions, and garlic, and in the employment of liquid food. The restriction as to food was probably the most important part of the treatment, for experience has shown that no reliance can be placed on the drugs alone.

The inhalation of chloroform has been tried, and we have lately received favourable accounts of it. A very large experience, however, would be necessary in order to form a correct estimate of its value. Should further experiments on the effect of drugs be made, that of the inhalation of chloroform might be tested and ascertained.

It would be useless to enumerate other modes of treatment which have been suggested, but which offer no prospect of success. We must close this section of our Report with the admission, that in this as in other countries no drug has been found which can be recommended as either an antidote or a palliative. It may nevertheless be desirable, under stringent regulations, and by the instrumentality of competent persons, to investigate the influence which certain specific agents may have on the course of the disease, some of which will be found referred to in the reports submitted to us.

7. *Future Precautions.*

We have not yet referred to the progress of the disease since the date of our Second Report. It has been remarkable and instructive. It will be remembered that there was a very rapid increase in the number of attacks at the end of November and the beginning of December 1865. The reported attacks rose from 3,610 and 3,828 in the weeks ending November 25th and December 2nd, to 5,356 and 6,054 in the two following

* Report of Mr. Barron on the Cattle Plague in Belgium, presented March 1866. See also Dr. Hamilton's letter, App. C., II.

weeks. The number of attacks then increased weekly until in the week ending February 17th, 1866, no less than 13,000* fresh attacks were reported.

We see no reason to doubt that the lessened rate of progress during the last two months is substantially due to the new repressive measures; viz., slaughter, stoppage of cattle traffic on railways, increased restriction of movement on common roads, and more complete measures of isolation and disinfection. In proof that the measures of isolation and slaughter were the effectual agents, we select the statistical returns from the counties of Yorkshire and Cheshire. The Act authorizing slaughter came into force on the 20th February, and, as will be seen, the diminution in the number of attacks in successive weeks was not only coincident with the action of the new restrictive measures, but runs a course closely parallel to the operation of the most important of these measures—slaughter.

	Week ending	Yorkshire.		Cheshire.	
		Fresh Attacks.	Killed.	Fresh Attacks.	Killed.
Before the Act.	Jan. 6	2,028	28	1,883	14
	„ 13	1,508	48	2,317	13
	„ 20	1,314	40	3,547	9
	„ 27	2,034	36	3,448	7
	Feb. 3	1,426	23	3,005	3
	„ 10	1,455	17	4,671	11
	„ 17	1,836	51	4,378	8
After the Act.	„ 24	1,369	277	3,671	446
	March 3	1,193	739	1,273	855
	„ 10	811	882	1,827	1,514
	„ 17	999	972	1,380	1,151
	„ 24	683	659	1,271	1,104
	„ 31	534	517	765	660
	April 7	338	330	808	707

At the same time these figures show that the slaughter of diseased animals has been enforced with different degrees of stringency in different counties; it appears to have been more systematically done in Yorkshire than in Cheshire; in the latter county, indeed, in no single week has the number of animals killed been equal to the attacks. In fact, taking the six weeks ending March 31st, there were 10,187 animals attacked, and only 5,730 slaughtered. So that, if these returns are correct, 4,457 diseased animals were left in Cheshire to spread contagion. Or, omitting the first week after the passing of the Act, there were in the five weeks ending March 31st 1,232 diseased beasts left unslaughtered out of 6,516 attacks. In Yorkshire, in the same five weeks, there were 451 left unslaughtered out of 4,220 attacks. The Act has, therefore, been more fully carried out in Yorkshire than in Cheshire, though in neither county perfectly.

Again, taking the reported numbers of attacks, deaths, and recoveries for the whole island, we find that they stand as follows:—

Week ending	Attacked.	Died.	Recovered.
March 3 -	7,310	3,271	2,102
„ 10 -	6,518	1,185	1,151
„ 17 -	6,261	779	1,014
„ 24 -	4,704	318	543
„ 31 -	3,956	154	394
April 7 -	3,361	131	267
„ 14 -	2,582	108	354
„ 21 -	2,823	93	210
Total - -	37,515	6,039	6,035

Within these eight weeks more than 12,000 diseased animals appear to have escaped the operation of the Act.

* It must be observed that these figures, and those which follow, are taken from the weekly returns, and will probably receive some corrections in the return for the quarter. The "back cases" reported in the week ending February 17th exceed 5,000.

The very principle of stoppage by slaughter is to make the killing follow immediately on the attack. If there be any delay,—if treatment be resorted to and killing be delayed till hope of recovery is lost,—the object of slaughter is frustrated.

As it is, the disease has been limited and partially arrested even by this imperfect enforcement of the Act. But we fear that the limitation will stop short of complete arrest. More vigorous action must be used, if it is to be utterly stamped out. To do this effectually demands unsparing strictness, as well as unremitting watchfulness. Too much stress, we must add, cannot be laid on the enforcement of disinfection. How long the poison may lurk in sheds and yards, or in manure, fodder, or other things, which may have been left undestroyed, cannot be known. The history of the attacks of Cattle Plague in the last century shows that, though the disease may be repressed in the country generally, or be apparently wholly extirpated in particular localities, it again breaks out where there has been any laxity in disinfecting the places where it at one time prevailed. Unless rigid and systematic means of disinfection are adopted throughout the country, there is much reason to fear that there will be many local outbreaks, which, if not immediately stamped out, may become general. For a long period the vigilance of local authorities, and a general supervision of them by the Government, must be exercised to prevent the reappearance of the disease in districts from which it has departed.*

With a view to the future, it is essential that the re-introduction of the disease from abroad be guarded against. In our Second Report we recommended to Your Majesty that foreign cattle should be slaughtered at the port of disembarkation, or, if sold for store purposes, should be placed in quarantine. We believe that the whole system of cattle transport should be revised; that good landing-places, lairs, and sheds, in which the cattle may be properly housed, tended, and inspected, should at once be constructed at the ports where cattle arrive; and that the trade in foreign cattle, which has grown of late years to such vast proportions, should be subjected to proper regulations.

On another point, to which cursory reference was made at the conclusion of our Second Report, we wish to add a few words. There is hardly a country in Europe, we believe, in which laws have not been enacted, and where some machinery does not exist, for the detection, and for arresting the spread, of contagious diseases among cattle. Copies, extracts, or summaries of such laws and regulations have been sent home by Your Majesty's Ministers at many foreign Courts,—amongst the rest, from France, Belgium, Austria, Russia, Prussia, Denmark, Switzerland, Bavaria, Saxony, Hanover, Baden, Hesse-Darmstadt, and Hesse-Cassel. Several of these, or such portions of them as directly related to Cattle Plague, have been published in the Appendices to our First and Second Reports. Of these laws and regulations some are of old standing; parts of the French and Belgian codes date from periods anterior to the French revolution. Many of them are extremely stringent and minute: in Austria, in Russian Poland, and in Prussia, the genius of those Governments, and the constant neighbourhood of a formidable danger, would naturally beget a system of precautions which would be impossible, as well as plainly uncalled for, elsewhere; and the grazing cantons of Switzerland, with their vast tracts of open mountain pasture, might be expected to adopt measures which would be unsuitable to countries mainly arable. But the general frame is nearly the same everywhere. The common object is sought to be attained by most or all of the following means;—1. By making it the legal duty of the stock-owner (a duty enforced by penalties more or less severe) to give the earliest notice of the presence of a contagious disease; 2. By arming the local authorities, or the Executive in the last resort, with power to enforce separation,—the isolation (if necessary) of infected herds, places, or districts,—slaughter, purification, and disinfection; 3. By making pecuniary compensation to owners of animals slaughtered; 4. By providing, as far as may be, a supply of regularly trained and certificated veterinary surgeons; and by the appointment of some of these as district inspectors, with certain privileges and functions in relation especially to contagious diseases. There are, of course, infinite differences of detail. The regulations vary as regards the constitution of the local authorities; the powers given to them; the apportionment of power between them and the central Executive; the cases in which compensation is to be paid; the measure of compensation, which may be the whole, four-fifths, two-thirds, one-half, one-third, of the sound value of the beast destroyed; the fund on which compensation is charged, which may be local or general, and may

* Layard, writing in 1757, says, "The disease, thank God, is considerably abated: and only breaks out "now and then in such places where, for want of proper cleansing after the infection, or carelessness in "burying the carcases, the putrid fomes is still preserved, and is ready, at a proper constitution of the air, "or upon being uncovered, to disperse such a quantity of effluvia, that all the cattle which have not had it "will be liable to infection."—(Layard, *The Distemper among Horned Cattle*, p. xx.)

be raised from the stock-owners as a class, or from the public;* the degree of State interference in the training of the veterinary profession, and the duties and rights assigned to the members of it. But the same leading principles seem to be generally adopted. In this country the vaguely defined powers temporarily vested in the Privy Council by the Act 11 and 12 Vict. c. 107, amended and explained by an Act of the present session (29 Vict. c. 15), the Cattle Diseases Prevention Act, which will expire next year, together with the power of regulating importation created by the 11 & 12 Vict. c. 105, and the existence of a chartered "College," or incorporated body of veterinary surgeons, and certain recognised places of veterinary instruction, are, we believe, all that stands in the place of the mass of precautionary measures above described. How far, and under what modifications, precautions which work well abroad are practicable or would be useful here, is a question which can only be answered by examining them. But we think it right to direct attention to the subject, and to the lessons taught by the history of the Cattle Plague during the last nine months in Great Britain, Belgium, Holland, and France. It is difficult, as we have seen, to extemporise codes of regulations—it is impossible to extemporise legal authority and administrative machinery—fast enough to cope with the ravages of a virulent contagious disease. Legal authority has now been obtained, regulations have been made, and machinery established. The whole system, however, is temporary, while the danger, in future, can hardly be regarded as something rare and occasional. The disease may reappear at any time, and without warning, and, when it does appear, means ought to be ready for crushing it without a moment's delay.

We believe further, that it is now the time to carry out fully and permanently the changes required in the mode in which meat is supplied to our large towns. Considerable alterations have taken place already, and these have not been attended with the inconvenience which was anticipated. We would gladly see an inquiry instituted without delay, to determine whether slaughter-houses might not be transferred from all our large towns to suburban points on the lines of railway. A few large slaughter-houses, properly arranged on the best principles, and provided with pastures and sheds where the cattle could rest, would take the place of the innumerable ill-kept and ill-tended places which exist in all large towns. The change would eventually benefit alike the customer and the butcher, while the saving of pain and torture to the animals themselves would be immeasurable. The Cattle Plague has been a great calamity, but it has put a stop, for a time at least, to much that was cruel and pernicious in operation: we trust that this wholesome effect will be lasting, and that it will pave the way for more extensive reforms.

(Signed) SPENCER.
CRANBORNE.
ROBERT LOWE.
LYON PLAYFAIR.
CLARE SEWELL READ.
H. BENCE JONES.
RICHARD QUAIN.
E. A. PARKES.
THOS. WORMALD.
ROBERT CEELY.
CHARLES SPOONER.

1st May 1866.

MOUNTAGUE BERNARD.

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* Thus in Prussia compensation is paid in certain cases by the district, in others by the Treasury, and, in provinces where Cattle Insurance Associations have been established, to which all stock-owners are obliged to contribute, by the funds of those associations. The principle of compulsory insurance is likewise adopted in Russian Poland, and applied to this object. In Belgium, it is paid by the State, which, it appears, has long had difficulty in keeping down the amount, and protecting itself against fraud and encroachment. In Holland, by local taxation; we believe, by a cattle-tax, supplemented last year by the Treasury. In Hanover, by a cattle-tax equal to $1\frac{1}{2}d.$ a head on cattle in the marsh and $1d.$ on those elsewhere—a levy which may be imposed, if necessary, six times in the year. In the grazing cantons of Switzerland, out of the sum produced by certificates of soundness, without which no animal may be moved, and for which $1d.$ a head is charged. The produce of these payments in the canton of Berne exceeded 17,000*l.* at the end of last year.

REFORM CLUB
PALL MALL

APPENDIX.

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APPENDIX A.

REPORTS PREPARED FOR AND PRESENTED TO THE COMMISSIONERS ON SPECIFIED HEADS OF INQUIRY.

On the Nature, Progress, and Symptoms of the Cattle Plague, and the Modes of its Propagation.

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

J. BURDON-SANDERSON, M. D.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,

ASSISTANT PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION AND THE MIDDLESEX HOSPITAL.

REFORM CL... PALL M...

Introduction.

On the 25th of October last, I had the honour to receive instructions from the Experimental Committee of the Royal Commission to report to the Commission on the origin, progress, and symptoms of the Cattle Plague, and on its modes of propagation. Under the first of these heads I was requested to study the disease in animals of different species, and in particular to investigate its characters when produced by inoculation as compared with those which are met with in animals to which it has been communicated by natural infection. And with reference to the propagation of the disease, it was deemed expedient that such experiments as were necessary should be made for the purpose of determining the following among other questions; viz., 1. To what species of animals can the disease be transmitted either by inoculation or natural infection? 2. What are the conditions under which the disease can be transmitted from one bovine animal to another through the air? 3. In what way and to what degree (if any) are the effects of inoculation modified or mitigated, either by the mode of operating, by the number of insertions or by the nature of the virus employed? Is there reason to hope that a virus may be obtained capable of producing a curable modification of the disease, whether (*a*) by diluting the virulent fluid with innocuous fluids or by mixing it with antidotes; (*b*) by transmitting the morbid poison through animals of another species; (*c*) by selecting as sources of virus animals in which the disease assumes a mild character, or (*d*) animals in the earliest stages of the disease? 4. In what parts of the diseased organism does the virus exist? Is it confined to the morbid secretions, or are all the tissues and animal fluids virulent? and, if so, are they virulent in equal degree?

To these questions which suggested themselves at the outset, another has since been added, which has not only occupied the earnest thought of some of our most distinguished pathologists, but has engrossed the attention of the public to an extraordinary degree: I refer to the alleged protective power of vaccination. On the 26th of November I received a letter from Mr. Ceely, in which he communicated to me the desire of the Experimental Committee that experiments should be made for the purpose of determining whether or not vaccinated animals are susceptible of Cattle Plague, either by inoculation or natural infection; and, secondly, whether the present epizootic is of the nature of the malignant and pestilential form of bovine variola well known to have long prevailed in various parts of India, under the names of "Bussunt," "Mhata," and "Gotee," and represented on high authority to be identical with the disease described by Lancisi and Lanzoni in Italy in 1711, and subsequently by Layard, Brocklesby, and others in England. The experiments proposed by Mr. Ceely consisted in vaccinating a sufficient number of animals, and in subsequently exposing such of them as had been vaccinated successfully, to natural infection and inoculation.

It was also necessary for the complete investigation of the disease, that in a certain number of cases the liquid secretions should be collected from day to day during its progress. After various unsuccessful attempts, and many vexatious delays arising from the inaptness of the workmen, and the unusual character of the work required, I was at length enabled (from the 17th of November) to supply Dr. Marcet daily with a tolerably accurate statement of the quantity of urine passed during the preceding twenty-four hours by each of four animals (viz., 2 bovine animals and 2 sheep), as well as with an average specimen for analysis. As regards the bovine animals, this was accomplished by fixing above the pavement of each stall a flooring of wood-work, which was covered with lead sheeting, and placed at such an inclination as to ensure the efficient drainage of all liquid discharged by the animal into a cast-iron channel, leading to a suitable covered receptacle. For the sheep, cages of woodwork were constructed, the floors and sides of which were lined with zinc sheeting.

For the purpose of isolation, and for preliminary experiments on inoculation, as well as for observations on animals during exposure and during the progress of the disease, and for the anatomical investigations conducted by Dr. Bristowe, I was fortunate in obtaining, through the courtesy of Professor Gamgee, the use of spacious, well-drained, and well-ventilated stables, measuring 52 feet by 24 feet, and capable, if necessary, of accommodating a large number of animals; in addition to which, the admirably appointed dissecting room of the Veterinary College, Queen's Road, Bayswater, was placed at my disposal, and every facility for the prosecution of clinical observation was afforded me. But in obtaining suitable places for the reception of animals before exposure, and for subjecting them to treatment intended to render them insusceptible to infection (as *e. g.* vaccination), there was much greater difficulty in consequence of the unwillingness of the owners of stable-property to allow their premises to be occupied by cattle for experimental purposes. It was not until the beginning of January that I succeeded in obtaining suitable stables, through the obliging exertions of Mr. Scarlett of Notting Hill.

I have great pleasure in acknowledging here the friendly co-operation I have received during the progress of the experiments, not only from Professor Gamgee but from the other Lecturers of the Bayswater Veterinary College. I have above all to acknowledge my obligations to Mr. Duguid, Professor of Physiology, whose unwearying industry and rare scientific ardour have mainly contributed to whatever measure of success has been attained in the prosecution of the present inquiry.

Dr. Sanderson. Report to Commissioners.

The following is a summary of the animals purchased or otherwise obtained for the objects of the inquiry up to the present time:

First series.—Two milk cows and four yearlings (viz., two heifers and two bullocks). All of these animals were brought from farms in rural districts at that time free from Cattle Plague. The yearlings were placed in the experimental stable on the 7th of November, and subjected to preliminary observation for three weeks. The cows entered the stable respectively on the 14th and 19th, and were similarly kept under observation until the 30th. On the 1st of December, four of the animals were inoculated with mucous discharge collected near Aylesbury from the eyes and nose of a cow a few hours before death, kindly forwarded to me by Mr. Ceely. The remaining animals, viz., one cow and a bullock, were left uninoculated. The bullock was placed in a stall adjoining those of the inoculated animals, the cow in another stable communicating with the first by ventilators near the roof. The four inoculated animals contracted the disease, and recovered; the others were infected naturally, the bullock on the 13th of December, the cow on the 16th, and died.

Second series.—Three yearling heifers were introduced into the experimental stable on the 27th of December. Of these, one was placed in the stall which had been occupied by the bullock, and in which it had died on the 21st, the stall not having been purified; the second, in a stall in the same stable, previously occupied by one of the animals that had recovered; and the third in the adjoining stable already referred to, next stall to the cow that had recovered, and was then convalescent. These animals contracted the disease, the first-mentioned on the 6th of January, the second on the 5th, and the third on the 6th, that is 9-10 days after admission. All of these animals died.

Third series.—A cow and three yearling heifers were placed in a stable which had not been previously occupied by cattle, on the 5th of January, for the purpose of experiments on vaccination. On the 8th of January it was discovered that one of the heifers was affected with Cattle Plague, which had apparently already arrived at the fifth day of its development. It was immediately removed to the experimental stable, where it afterwards recovered. On the 11th of January the cow and the other two heifers became affected, as well as a cow which had been placed for observation in the same stable, belonging to Professor Gamgee. All of these animals were removed to the College as soon as they manifested symptoms of illness, and died on the seventh day. They had been previously vaccinated by Mr. Badcock on the 15th.

Fourth series.—On the 2d and 5th of January thirteen sucking calves were procured, and placed in a stable at Notting Hill, for the purposes of vaccination and inoculation with the virus of smallpox. Of these one appearing sickly was removed to the College on the 6th of January, and was found to be affected with Rinderpest.* None of the others contracted the disease. Six of the calves were inoculated with virus collected by me on the 3d and 5th, by the kind permission of Mr. Marson, from patients at the Smallpox Hospital, at the fifth or sixth day of the disease. Of these inoculations two only were successful. On the 9th five of the remaining calves were vaccinated with current human lymph by Mr. Ceely. In two of these cases satisfactory results were obtained, and they yielded lymph for the vaccination of four others (including three which had been previously inoculated without success). This last vaccination was performed on the 16th or 17th. At this point the experiments were arrested by a cause which had from the first manifested its unfavourable operation. The calves had been fed during the first few days after they were purchased with milk derived from the cow already referred to as subsequently affected with Rinderpest. Whether in consequence of this circumstance or for other reasons, they gradually declined in health, and finally, in spite of the most careful nursing and feeding, and the employment of every means which the experience of Mr. Badcock could suggest, they died in rapid succession. With respect to those which had been successfully vaccinated, a special effort was made to preserve them, by placing them with milk cows which had already passed through the cattle disease, but without success. One of them was exposed to infection during the last few days of its life, but there was no reason to suppose that the result was in the slightest degree influenced thereby. None of the animals in question exhibited any symptoms of Rinderpest, and those that were dissected after death did not show any of the anatomical results of the disease.

Fifth series.—On the 7th of November four sheep were procured, viz., two rams and two ewes. On the 14th, a ram and a ewe were placed each in one of the cages already referred to, and subjected to observation during a period of two weeks. On the 1st of December they were inoculated with the same virus which was employed for the inoculation of the first series of bovine animals. After two days they showed slight increase of temperature and other slight signs of functional disturbance, but the phenomena of Rinderpest did not develop themselves. The other two sheep were exposed to natural infection by placing them on the 20th of December in the stall in which the bullock of the first series had just died. They exhibited the first symptoms of Cattle Disease on the 27th and 30th. Both of them recovered.

Sixth series.—Two goats (male and female) were procured at the same time as the sheep. They have remained in the stable during the whole period of observation, and have been placed in the stalls vacated by dying animals, without result. On the 26th of January they were inoculated, without further effect than a transient increase of temperature.

PART I.

Phenomena of Cattle Plague during Life.

1. *General characters and progress of the disease.*

Cattle Plague is an essential or general fever. Of it, more clearly than of any human disease of the same class, can it be shown that the disturbance of the system which we understand by the term fever may exist independently of local changes occurring in particular organs; for with respect to it a fact new to pathology has been discovered, that the increase of the temperature of the body, which is the one and only symptom which all fevers have in common, exists for several days before any other derangement of health can be observed.

But although constitutional or general in its origin, Cattle Plague is attended with local alterations of structure, some of which are so constant and invariable that no definition of the disease can be complete which fails to recognize and include them.

The observations and experiments which have been made, so far as they have been carried out, relating to the phenomena of the disease during life, lead to the conclusion that, with reference to its *constitutional effects*, the disease consists in (1) increase of the temperature of the body; (2) increase in the elimination of urea by the kidneys, indicating increased disintegration of tissue; (3) alteration of the physical and chemical qualities of the blood, manifesting itself in impairment of its coagulability and in a marked tendency to capillary hæmorrhage; and lastly (4), a general septic condition of the fluids and tissues, in virtue of which they are unnaturally prone to decomposition even during life.

With reference to its *local manifestations*, the disease appears to be distinguished by an alteration

* The cow from which this calf was removed is still well, and has not contracted the disease, nor had cases of cattle disease occurred in the neighbourhood from which it was brought.

of the superficial structures of the skin and mucous membranes, consisting (1) of minute capillary congestion (*hyperæmia*) of the vascular layer (*corpus papillare, membrana propria*); (2) of increased as well as perverted growth of the structural elements, naturally developed at its free surface, this change leading to thickening, softening, disintegration, or detachment of the epidermis or epithelium respectively, but very rarely, if ever, to ulceration or loss of substance in the deeper tissue; and lastly (3) of increased and perverted activity of the secreting glands of the skin and mucous membrane, resulting in mucous or sebaceous discharges.

Cattle Plague belongs to that class of fevers which is distinguished by marked uniformity in their development and duration. In this respect it resembles smallpox more than any other disease which affects man. The resemblance is however generic rather than specific, for in Cattle Plague the essential phenomenon of smallpox, the eruption, is wanting.

In fatal cases the progress of the disease is divided into three stages. The first stage, comprising the first and second day, is marked by no appreciable change in the condition of the affected animal, excepting increase of temperature. During the second stage, which comprises the third, fourth, and fifth days of the disease, its symptoms develop themselves in quick succession. The appetite fails, rumination ceases, the daily excretion of urea by the kidneys is augmented, while the animal loses strength and weight. The last stage, that which immediately precedes the fatal termination, is characterized by the rapid decline and cessation of the vital functions, and, above all, by sudden sinking of the temperature of the body.

The leading phenomena of the disease may be described as follows, according to the order of time in which they occur:

During the first two days, as has been already stated, there are no symptoms excepting elevation of temperature, so that the time of commencement of the disease can be determined only by the thermometer. But on the third day an eruption, exactly resembling that of thrush, appears on the gums and inside of the lip. The eruption usually commences by the formation of groups of very minute raised points or dots on the surface of the mucous membrane, which are usually first seen a little below the corner tooth on each side. This appearance is in many cases neither preceded nor accompanied by any redness of the surrounding surface, but occasionally a slight blush is perceptible near the elevation. The animal continues to ruminate, and its appetite, pulse, and breathing are unaffected.

On the next day the eruption above described on the mucous membrane of the mouth is found to have extended. The whole of the surface between the lower lip and the gum is studded with raised groups of elevations, while those previously observed below the corner teeth have coalesced, so as to form patches. The animal is listless, takes less food than usual, and ruminates irregularly, but the pulse and respiration are unaltered. On this day alterations may often be observed on the cutaneous surface. In the neighbourhood of the vulva, and on the inside of the thighs, the skin is found to be greasy, as if smeared with an unctuous substance.

On the fifth day the animal is for the first time obviously ill. The head hangs down, the ears are thrown back, and the attitude and movements are suggestive of depression. The pulse is sensibly weaker, and often the artery feels hard and threadlike under the finger, expanding scarcely perceptibly with the systolic impulse. The breathing is sometimes almost natural, but more frequently begins to be oppressed and irregular.

With the sixth day the alterations of the mucous membrane of the mouth attain their full development. The under lip is covered with a crust of white opaque material (consisting of epithelium mixed in most instances with the filaments and spores of a hyphaceous fungus) which is either confluent and continuous, or in patches. This crust is usually of the consistence of cream cheese, in which case it adheres so slightly to the surface on which it lies, that the slightest touch is sufficient to detach it. Wherever it is so separated, the bright red vascular surface of the mucous membrane (*membrana propria* of anatomists) is exposed—raw looking, but free from ulceration. Similar appearances are observed on other parts of the mouth, particularly on the upper gum, on the dental pad, on the cheeks and hard palate, and on the lower surface of the tongue near its lateral margins.

During the sixth day the leading symptoms are those which arise from *diminished* contractile power of the heart and voluntary muscles. The affection of the heart is indicated by increased feebleness and frequency of the pulse, and by the extinction of the præcordial impulse, that of the voluntary muscles by the attitude and movements of the animal, which are so indicative of adynamia, that many writers have been misled by them into the belief that in Rinderpest there is a special paralytic affection of the spinal nervous system. At the same time the mechanism of the respiratory movements is modified in a remarkable and characteristic manner, the modification being dependent partly on the cause above referred to, and partly on pathological changes having their seat in the air passages. The alvine discharges, which, during the previous progress of the disease, were firmer and harder than natural, now become soft, and eventually liquid and dysenteric. The temperature of the body, which up to the fifth day has gone on increasing, rapidly sinks to below the natural level—this loss of animal heat being attended with a correspondingly rapid diminution in the quantity of urea excreted by the kidneys.

Death usually occurs during the seventh day. It is not preceded by convulsion or any other symptoms worthy of special notice.

2. *Alterations of the temperature of the body.*

From the observations made morning and evening during the three weeks ending November 30th on the experimental animals, Nos. 1 to 6, it was ascertained that in four yearlings (two heifers and two bullocks) the maximum, minimum, and mean temperatures were as under:—

Designation of Animal.	Number of Observations made.	Maximum.	Minimum.	Mean.
No. 1	40	106·4	101·3	102·87
No. 2	39	103·8	101·3	102·44
No. 3	58	103·6	100·8	101·85
No. 4	36	103·7	101·7	102·78

These results agree so closely together that they may probably be accepted as generally applicable to healthy animals of about the same age and description. The mean of the whole number of observations taken is 102·25.

In the two cows the readings indicated a somewhat lower temperature. They were as follows:—

Designation.	Number of Observations made.	Maximum.	Minimum.	Mean.
No. 5	51	101·9	100·3	101·18
No. 6	20	102·6	100·9	101·76

The following table exhibits the alterations of temperature during the progress of Cattle Plague, as observed in 11 cases of the disease at successive intervals of 24 hours after the first elevation of temperature was noticed. Of these cases four were inoculated, all of which recovered, while the remaining seven contracted the disease by natural infection and all died.

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TABLE SHOWING the Mean and Extreme READINGS of a registering Thermometer, the bulb of which was introduced into the rectum, in 11 animals suffering from Cattle Plague.

Day of the Disease.		1st day.	2d day.	3d day.	4th day.	5th day.	6th day.	7th day.	8th day.	9th day
Four animals, viz., a milk cow and three yearlings inoculated with discharge from the nostrils of a cow affected with Cattle Plague on the 1st of December 1865, all of which contracted the disease, and recovered.	Highest	104·6	106·1	107·1	106·8	107·0	107·2	105·8	106·0	105·9
	Lowest	103·8	104·1	105·6	105·2	106·0	105·3	104·6	102·8	102·5
	Mean -	**104·2**	**105·4**	**106·6**	**106·3**	**106·4**	**106·1**	**105·3**	**103·5**	**103·4**
Seven animals, viz., a milk cow and six yearlings, which contracted the disease by natural infection, and died.	Highest	105·7	106·3	106·4	106·8	106·4	106·6	N.B. All these animals died before the close of the seventh day.		
	Lowest	103·2	104·3	104·7	104·9	104·3	98·2			
	Mean -	**104·1**	**105·3**	**105·7**	**106·0**	**105·4**	**103·5**			

The numbers show that the increase of temperature was somewhat greater among those animals which were inoculated and recovered than among those that died, and that in some of the cases of the former class, in particular, high readings were obtained on each occasion for a period of four or five days. It further appears that in the fatal cases the acme was reached a day earlier than in the others, this being no less true of the extremes than of the means, and that in the former the decline was rapid and decisive, whereas in those animals which were destined to recover it was both slower and more irregular.

From these facts it may clearly be inferred, that although the increase of temperature is of inestimable value for the recognition of Cattle Plague in its earliest stage, it is not of much importance as an aid to prognosis, for the cases in which the highest temperatures were recorded, and the standard of health was most exceeded, were precisely those of which the issues were most favourable.

This was strikingly exemplified in the animal No. 6, in which, although the general symptoms were certainly milder than many of the others, and the recovery more rapid, the temperature rose during the sixth day to 107·2, and remained for two or three days not less than five degrees above the mean temperature of the animal during health.

It is further to be observed that although the absolute increase of temperature, *i.e.*, the number of degrees by which the healthy standard is exceeded, has but little relation to the severity of the case, the variations which occur during its progress are much more significant. If the heat of the body begins to sink rapidly during the fifth or sixth day the change indicates with tolerable certainty that death is approaching. In this case it is accompanied or followed by a marked diminution in the force of the pulse, by an aggravation of that peculiar dyspnœa which is observed in almost all severely affected animals, and in some cases, by a sudden aggravation of the diarrhœa. It indicates in short that the animal is passing into that condition which has been described by many authors as a distinct stage of the disease, viz., the colliquative stage, or stage of collapse.

In animals about to recover the temperature also falls, but the decline is much more gradual, and does not commence until the seventh or even the eighth day. It is coincident with the gradual restoration of health. The difficulty of breathing and general oppression cease, the pulse acquires its natural force, the eruption on the mucous membrane of the mouth heals, and finally the animal begins to feed and ruminate as usual.

3. *Alterations of the Urinary Secretion.*

In all essential fevers the progress of the disease is attended with rapid emaciation and loss of weight. These results are not merely nor even mainly due to the disappearance of fat, but are referable in great measure to the increased activity of those molecular organic changes which result in the conversion of the nitrogenous constituents of the tissues into simpler chemical forms. Whence it happens that in these affections those proximate principles which are instrumental in the elimination of nitrogen from the organism, appear in the secretions in augmented quantity. Of these, urea is at once the most important, and the most easily investigated.

In the course of the present inquiry the quantities of urea daily discharged during the progress of Cattle Plague have been estimated only in five of the cases under observation. In three of these cases the results are unsatisfactory and of comparatively little value, for no analyses were made during the period of health preceding infection, nor even during the first two days of the disease. In the other three cases preliminary series of analyses were made which extended over periods varying from seven days to four weeks. The results show distinctly that in these three animals (of which one recovered, and two died) there was an increase, not only in the relative quantity of urea contained in the urine, but in the absolute quantity discharged during each day, and that the increase was so considerable in each instance that it could not be regarded as accidental or as attributable to any cause excepting the influence of the disease.

The general results of these analyses are stated in the following table (in so far as is necessary to elucidate their relation to the progress of the symptoms) arranged according to the periods of 24 hours, during which the urine was collected. In the last line of each division of the table are given the means of the temperatures read during the corresponding days. Further details will be found in the chemical report.

TABLE showing the quantity of Urine collected during each day of the disease in five cases of which four were fatal (together with its specific gravity and richness in Urea), compared with the means of the observations of temperature taken during the same periods :—

Designation of Animal, and Result.		Average during Health.	1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	6th Day.	7th Day.	8th Day.
Bullock No. 3 (Death).	Quantity of Urine collected at the end of each day	969·0	112	97	76	44	71	147		
	Specific gravity of Urine collected	1050·5	1049	1045	1044	1042	1034	1024		
	Per-centage of Urea in the same	2·82	2·30	2·66	3·52	4·70	5·04	3·17		
	Total quantity of Urea in 24 hours	1176·6	1129·04	1130·89	1172·41	906·32	1568·31	2042·31		
	Temperature (mean of readings at time of collection, and 12 hours before)	101·85	103·6	105·3	105·6	106·4	105·3	106·2		
Heifer No. 7 (Death).	Quantity of Urine in 24 hours as above	98	155	76	57	41	78	23		
	Specific gravity	1038·3	1026	1044	1045	1038	1035	1017		
	Per-centage of Urea	—	1·54	2·72	3·42	3·73	5·17	1·22		
	Total quantity of Urea in 24 hours	850·6	1044·3	904·4	878·4	669·1	1764·4	122·8		
	Temperature as above	102·34	105·7	105·8	105·5	106·5	106·3	103·8		
Milk Cow No. 5 (Death).	Quantity of Urine in 24 hours	—*	—	—	220	161	163	140		
	Specific gravity	—	—	—	1025	1020	1023	1018		
	Per-centage of Urea	—	—	—	1·82	1·73	2·83	2·32		
	Total quantity of Urea in 24 hours	—	—	—	1754·7	1220·7	2021·7	1423·5		
	Temperature as above	101·18	103·0	104·0	104·7	104·4	104·4	100·2		
Heifer No. 12 (Death).	Quantity of Urine in 24 hours	—*	—	—	132	50	50	30	36	
	Specific gravity	—	—	—	1027	1030	1025	1029	1028	
	Per-centage of Urea	—	—	—	2·74	4·22	4·07	4·00	3·46	
	Total quantity of Urine in 24 hours	—	—	—	1588·3	923·1	890·31	525·0	544·9	
	Temperature as above	102·6	103·8	105·6	106·3	106·4	105·1	103·2	102·9	
Milk Cow No. 6 (Recovery).	Quantity of Urine in 24 hours	168·0	162	176	177	200	220	134	124	91
	Specific gravity	1045·8	1044	1045	1042	1039	1031	1025	1039	1040
	Per-centage of Urea	2·00	2·91	2·77	2·72	2·82	2·38	3·28	3·62	3·57
	Total quantity of Urea in 24 hours	1487·4	2062·8	2132·8	2105·6	2467·7	2290·8	1922·8	1963·9	1421·8
	Temperature as above	101·76	103·1	104·6	105·6	105·6	106·6	106·5	103·5	103·8

So far as so small a number of analyses are worthy of confidence the results are significant. The indications they afford may be stated as follows :—(1) Taking one case with another the largest quantity of urea was yielded on the fifth day of the disease, whereas the highest temperature was recorded on the fourth ; but in one of the fatal cases both events were deferred until the sixth day, *i.e.*, the day before death. (2) In every instance the specific gravity of the urine was diminished during the whole course of the disease, so much so that even when no more than a quarter of the natural quantity of urine was passed, its specific gravity was reduced from 1038 to 1017. (3) In the fatal cases the per-centage of urea was nearly doubled, the increase being greatest at the same period of the disease at which the total daily excretion of urea was most rapid. But in the animal that recovered the increase although constant and well-marked, was not so considerable, and was moreover delayed until the eighth day, when the diurnal yield of urea had already much diminished.

For information on all other questions relating to the condition of the urine during Cattle Plague, I must refer to the report of Dr. Marcet. It may, however, be worth while stating here that during the period immediately preceding death in fatal cases it was repeatedly found that the urine was albuminous. Occasionally it was observed to be acid or neutral, instead of being alkaline ; but this last fact appears not to be of very great importance, for in all conditions, whether of health or disease, the urine of herbivorous animals becomes acid when alimentation ceases.

4. *Alterations of the Secretion of Milk.*

For a detailed account of the alterations of the milk in the two milk cows which were submitted to obser-

* In this case the analyses were not commenced until the 3rd day.

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vation, I must refer to the chemical report, the quantity collected each day during health and disease having been forwarded to Dr. Marcet for analysis. In the cow No. 5, which at the time it was inoculated was giving about seven pints a day, the yield gradually declined during the progress of the disease, but never ceased. As the animal recovered the daily quantity increased to the previous average. In the cow that died the decrease was much more rapid. During the last two days only a few drachms could be obtained at each milking. The secretion was moreover entirely altered in character, being converted into a turbid liquid in which floated innumerable flaky or grumous particles. On microscopic examination it was found to contain, in addition to the ordinary milk granules, bodies resembling colostrum corpuscles, and vast numbers of spheroidal hyaline corpuscles, scarcely larger than blood globules, many of which were free, while others were surrounded with granular conglomerates.*

5. *Alterations of the Pulse.*

It is usually stated that the Cattle Plague is attended at its commencement with febrile reaction, and that this condition is ushered in by slight rigors and sometimes by shuddering. I have no doubt that these phenomena have been observed by the authors who have referred to them, but they have escaped my attention. Rigors of a marked character occur at a later period in the disease, but of an entirely different nature from those in question.† According to Röll and Spinola, the pulse usually varies during the second stage of the disease from 60 to 80 beats per minute, but Spinola found that in vigorous animals, in which the febrile reaction was well marked, the pulse rose to 80 or 90. All authors agree that in the third stage, that of collapse, the pulse undergoes further acceleration, but even in this respect there is considerable variation in different cases. It is to be remarked with reference to all former observations on the subject, that the results of disease were not compared with those of health. My observations show that individual animals vary extremely even in the normal state, as regards the frequency of the contractions of the heart, so that unless the acceleration is very considerable no conclusion can be derived from any numerical observations made during the progress of disease, unless they have been preceded by a sufficient number of similar observations made during health. This has not been done, so far as I know by any one.

A glance at the observations made twice a day during the early stage of Cattle Plague, and the period immediately preceding the appearance of the first symptoms, will enable any one to satisfy himself that in each instance the acceleration of the pulse which attended the commencement of the disease was very inconsiderable. Indeed, in most of the cases it would be entirely impossible to distinguish by the mere inspection of the pulse-numbers between health and disease, or to say at what moment they began to be abnormal. But the comparison of the average number of pulsations per minute, enumerated while the animal was under the influence of the disease, with those taken during health, affords more accurate information, showing that in general, though not universally there was an acceleration.

Table exhibiting the average number of pulsations per minute in six animals (viz., 2 milk cows, 2 bullocks, and 2 heifers) (*a*) in the healthy state, and (*b*) during the progress of Cattle Plague.

Description of animal	Heifer.	Bullock.	Bullock.	Heifer.	Cow.	Cow.
Mode of infection	Inoculation.	Inoculation.	Nat. Infection.	Inoculation.	Nat. Infection.	Inoculation
Result	Recovery.	Recovery.	Death.	Recovery.	Death.	Recovery.
Pulse in health. Mean number of pulsations per minute	69·43	67·67	65·35	67·79	61·60	63·36
Pulse in health. Number of observations from which mean is calculated	46	45	65	45	55	25
Pulse in disease. Mean number of pulsations per minute	73·57	68·38	68·27	70·24	68·62	60·75
Pulse in disease. Number of observations from which mean is calculated	28	32	11	33	13	18
Difference	4·14	0·71	3·32	2·45	7·02	−2·61

The numbers show that in one of the animals that recovered, the pulse was actually slower by two and a half beats during the disease than it was before. Of those that died, one showed a very slight acceleration, and that (as may be readily seen by reference to Case No. 3) was entirely attributable to the last twenty-four hours of its life. In the cow, of which the pulse had before been remarkably regular, it became quicker by six beats.

In the collapse which precedes death in fatal cases, the acceleration of the pulse is, as might be anticipated, more marked than at any other period. Thus, in case No. 3, the pulse number, which thirty hours before death did not exceed 60, rose during the last twenty-four hours to 90. In case No. 5, the pulse rose from 70 to 108 in the last twelve hours. In case No. 12, there was a more gradual rise to about the same extent. But in No. 7 there was no constant acceleration, although once or twice high numbers were recorded.

From the preceding facts, it is obvious that the frequency of the pulse is a character of no importance with reference either to diagnosis or prognosis, for, with the exception of the final acceleration, which, in fact, is rather to be regarded as part of the process of dying than anything else, it appears to bear no relation to the condition of the animal. But it is far otherwise as regards the quality or strength of the pulse. Changes of arterial tension are more easily appreciated in bovine animals than in man, in consequence of the more complete exposure of the artery. It was found in all cases that the force of the arterial expansion remained unaffected up to the fourth or fifth day of the disease, that after this period it became gradually weaker, and that during the stage of collapse in fatal cases it was scarcely possible to appreciate it, even when the vessel was seized between the thumb and finger. At an earlier period, the sensation communicated was that which is understood by the word "thready," the artery feeling like a cord, and being scarcely affected by the systolic wave.

6. *Alterations of the Function of Respiration.*

The descriptions given by former writers show that the symptoms referable to the respiratory system, which have been observed in other countries, resemble in

* I am informed that a cat and four kittens fed on this milk died. The fact was not reported to me till some days afterwards, so that there was no opportunity of investigating the effects produced.

† See p. 15.

ir general character those that have presented themves in our experimental animals. But unfortunately rcely any of these descriptions are so definite or ailed as could be wished; so that I find it difficult feel quite certain whether the phenomena to which y refer are the same as those I have myself witnessed not. According to Professor Röll "The breathing is accelerated, the respiratory movements of the flanks excessive, and each act is accompanied with marked moaning (Stöhnen). The physical examination of the chest affords no indications of affection of the lungs, nothing abnormal being heard excepting moist râles of various character. Sometimes there is hollow expulsive cough, which is very distressing to the animal."* According to Dr. Weber "the movement of the intercostal spaces diminishes during the progress of the disease, until at length it is confined to a slow elevation of the sixth and eighth interspaces, which is immediately followed by collapse of the thoracic walls. The rapidly increasing emphysema of the lungs by which the disease was characterized, particularly at the commencement of the epizootic, was indicated by increased clearness and fulness of the percussion sound, and by an extension of the pulmonary resonance backwards. On auscultation moist râles of various tones were heard, which sometimes accompanied, sometimes masked the loud vesicular murmur. In extreme cases of emphysema neither the natural nor the abnormal sounds could be made out."†

The rate of breathing in ruminant animals is fficult to determine with certainty. It is liable to be terfered with not only by the movement of rumination, but by variations in the fulness of the digestive cavities, particularly of the first stomach; so that observations of the respiratory rhythm can only be of value when care is taken to note in each case the condition of the animal when the breathing was counted.

Thus, during rumination the animal breathes slowly, viz., from 15 to 20 times in a minute; but just before each bolus is returned from the rumen into the mouth it takes a deeper breath than usual, which is indicated by a momentary distension of the belly. This is immediately followed by a short but vigorous contraction of the abdominal muscles with closure of the glottis, by the combination of which actions the bolus is forced into the œsophagus. If, therefore, an animal is ruminating, care must be taken to enumerate the respiratory movements during the intervals between successive acts, or at all events to take the interruptions due to them into account. Generally speaking, it is better to observe the breathing during rumination than under any other circumstances, for this important reason, that the continuance of the process is a proof that the animal is not alarmed by the observer's presence. If, however, this cannot be done, care must be taken to avoid making observations when the digestive cavity is unusually full, for whenever this is the case, and particularly when the distension arises from the collection of flatus in the rumen, the breathing becomes, even in perfectly healthy animals, hurried, shallow, and unnatural.

The rate of breathing was determined in the experimental animals of the first and second series in the same way as that of the contractions of the heart. The results are given in the following table:—

ABLE exhibiting the average number of respirations per minute in six animals in the healthy state, and during the progress of the Cattle Plague.

escription of animals - - -	Heifer.	Bullock.	Bullock.	Heifer.	Cow.	Cow.
Iode of infection - - - - -	Inoculation.	Inoculation.	Nat. Infection.	Inoculation.	Nat. infection.	Inoculation.
Result - - - - -	Recovery.	Recovery.	Death.	Recovery.	Death.	Recovery.
Respiration in health. Mean number of respirations per minute	51·96	56·37	51·85	57·61	27·53	39·90
Respiration in health. Number of observations from which mean is calculated - -	47	46	64	45	57	25
Respiration in disease. Mean number of respirations per minute	33·33	36·52	50·91	43·79	57·0	34·79
Respiration in disease. Number of observations from which mean is cultivated - -	27	33	11	33	14	31
Difference - - - -	−18·63	−19·85	−0·96	−13·82	+29·47	−5·11

The table is of use as showing that the statement which has been made by some writers, that in Cattle Plague the respiratory movements are accelerated, is not in accordance with fact, for in every case excepting one, the difference between the averages of health and disease lay in the opposite direction. But with a view to diagnosis, the numbers are of little significance, for any one who is willing to take the trouble to compare the daily observations recorded in these six cases before and after infection, may readily satisfy himself that in the five cases in which the breathing was retarded as well as in the exceptional instance in which it was accelerated, the change of rate did not occur until an advanced period of the disease, and that during the first three or four days the animal respired at the same rate as during health.

Much more is to be learnt by studying the *mode* of respiration than by counting its frequency. During the first stage of the disease respiration is performed in a perfectly natural manner, but about the fifth day irregularities begin to be observable. From time to time the rhythmical movements of the chest are interrupted, and expiration is accompanied with an audible moan. This irregularity is at first so trifling that it would scarcely merit attention were it not the precursor of more serious derangements. On the sixth day (that is in fatal cases the day before death) the breathing usually assumes a character which is so remarkable that if once observed it cannot be forgotten. The chest dilates suddenly, but apparently with considerable effort, in consequence as I believe of the unnatural permanent expansion of the lungs due to obstructed expiration. This inspiratory movement is immediately followed by closure of the glottis, the expiratory muscles being at the same time thrown into violent action, much in the same way as they are in the act of rumination. The closure of the glottis is always attended with a sound (such as might be produced by the sudden

* Roll; "Lehrbuch der Pathologie und Therapie der Hausthiere." Wien, 1860, p. 356.
† Weber; "Rinderpest in symptomatologischer patholog. anatom. und medicinalpolizeilicher Beziehung." Prag, 1852, p. 13.

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closure of a soft leather valve) so loud that it can be heard at a considerable distance. This sound coincides with the resisted expulsive effort, which is often so strong as to throw the whole body of the animal into oscillation. The chink of the glottis continues closed for one and a half to two and a half seconds, the chest remaining expanded and motionless. At the end of this period, the air shut up in the thoracic cavity is expelled with a peculiar grunting noise, which is quite as characteristic as the valvular sound already described. It is immediately followed by a renewed inspiratory effort.

Thus the rhythm of the respiratory movements is completely altered. The pause instead of occurring between each expiration and the succeeding inspiration, that is when the breathing apparatus is in a state of relaxation, occurs when the chest is expanded, or, more accurately speaking, in the middle of the expiratory act, for inasmuch as the expulsiou of air from the chest commences immediately after the chest is filled, a considerable quantity escapes before the glottis has had time to close. At the moment that closure takes place the air confined in the chest is strongly compressed by the action of the expiratory muscles, and in this way gives rise to the interlobular emphysema which is so commonly observed in Cattle Plague.

It is impossible for the physiologist to witness the peculiar alteration of the respiratory mechanism above described without being reminded of the mode of breathing which is observed in animals after section of the pneumogastric nerves. In both conditions the breathing is retarded, and the chest over expanded, and in both the expiratory act is performed with violence. I do not refer to this analogy, because I imagine that there is any special perversion of the function of the pneumogastric nerves in Cattle Plague, for there is not the slightest ground for suspecting that these nerves have anything to do with the phenomena under consideration. The importance of the comparison lies simply in this, that *both affections*, the artificial and the natural, *result in emphysema*. It is now admitted by all physiologists that in order to the production of this condition in a healthy lung, (that is independently of degeneration of the pulmonary tissue,) two things are necessary ; namely, (1) That the vesicles should be in a state of extreme dilatation or expansion, at the commencement of each expiration ; and (2) That the expiratory effort should be forcible and violent. Now it is obvious these conditions exist in an intense degree, both in Rinderpest and after section of the vagi, so that without any unwarranted stretch of inference, it may be regarded as probable that the rupture of the vesicles, and the escape of air into the interlobular cellular tissue are produced in both cases by the same mechanism.

As regards the detection of emphysema during life my observations agree entirely with those of Dr. Weber. Although it several times happened that the lungs were found after death to be more or less emphysematous when I had failed in detecting the alteration by percussion, the physical signs referred to in the passage quoted above were found in all those animals in which the pulmonary emphysema was extreme. But in most of these well-marked cases this evidence was not required, for the emphysema was not confined to the lungs. The escaped air had made its way from these organs to the posterior mediastinum, and from thence to the cellular tissue of the back. Occasionally the crepitation of emphysema could be felt, not only in its most frequent situation on each side of the spines of the lumbar vertebræ, but in other parts of the body where the subcutaneous cellular tissue is sufficiently loose to allow of its extension.

The peculiar form of dyspnœa which has been described, has been witnessed in almost all of the animals I have had under observation, since the commencement of this inquiry. In the eight fatal cases of the first and second series it presented itself in a marked degree in six. In one it was observed only intervals, and in the animal No. 5 it was entirely absent. In this case the breathing became during last two days exceedingly rapid, the number of respirations in a minute varying from 90 to 96. There was no pause whatever, either before or after respiration. In the animals that recovered the dyspnœa was not intense, but there was no essential difference in mode of breathing. This was the case in all of inoculated animals of the first series, excepting in cow No. 6. In each instance, the alteration was observed only for two or three days preceding and following the acme of the disease, viz., from the 5th the 7th day of its progress. In the cow No. 6 breathing was scarcely altered throughout.

In order to form an opinion of the cause of remarkable phenomena we have been considering, it necessary to refer to the anatomical changes observ after death in the respiratory organs. With the exc tion of pulmonary emphysema, the only alterations whi occur with any constancy are those which have th seat in the larynx and trachea. The mucous membra lining these organs is intensely injected, and more less œdematous, besides exhibiting other pathologic characters to which it is not necesary to advert he These facts appear to me to afford a complete a satisfactory explanation of all that is observed duri life. In all animals, as is well known, the vo chords separate from each other in inspiration a approach in expiration, these movements being ve inconsiderable in the tranquil condition, but increasi in activity whenever the breathing is excited or inte fered with. Hence, we may readily understand th in the hyperæmic and tumid larynx of Cattle Plagu the expiratory narrowing of the glottis becomes co plete, while even during inspiration, the opening insufficient to allow of the free ingress of air. Hen the permanent dilatation of the chest, the enfeebl action of the diaphragm arising from permane depression of its central tendon, the laborious but r latively fruitless action of the other inspiratory muscl in expanding the thoracic walls, the fixation of the che during the prolonged closure of the glottis, and th noisy expulsion of the imprisoned air through th narrow chink, the moment that the vocal chor separate from each other for inspiration.

7. *Alterations of the Visible Mucous Membranes.*

The alterations of the mucous membrane of th mouth are regarded by Jessen and many other Russia veterinarians as so characteristic of Cattle Plague a to be almost pathognomonic. In the opinion o Rawitch,* however, they are not worthy of suc implicit dependence for the purposes of diagnosis ; fo although he had observed them in by far the greate number of cases of this disease, in a few they were absent. He adds, further, that in several animals affected with Foot and Mouth Disease, which happened to prevail among the experimental cattle during the period of his observation, appearances were met with on the lips and gums which so strikingly resembled those usually seen in Cattle Plague that they could not be distinguished.

Although the descriptions of all recent authors accord in the main with the observations which have been made in London, there is some difficulty in comparing them, in consequence of the frequent employment by these writers of terms which are rather expressive of the observer's opinion than descriptive of the object under examination; such, *e.g.*, as "aphthæ," "pustules," "croupous exudations," &c. Spinola says that the "epithelium of the mucous "membrane of the mouth becomes at first swollen "and softened, and is then thrown off in patches, by "which process erosions are produced. Sometimes "the epithelium is elevated so as to form little "vesicles filled with a yellowish fluid."† In the cases

* Rawitch; "Neue Untersuchungen über die pathol. Anatomie der Rinderpest." Berlin, 1864, p. 14.

† Spinola; "Mittheilungen über die Rinderpest gesammelt auf einer im Auftrage der K. Preuss. Staatsregierung im Frühjahr 1845, nach Polen und Russland unternommenen Reise." Berlin, 1846, p. 105.

ecorded by Weber in Galicia, "aphthæ" were always bserved; they were of indefinite form, covered with whitish granular exudation, which adhered slightly to he subjacent surface, and were easily detached.* Dietrich describes the appearances as consisting at irst of an aphthous eruption of red specks, which subsequently become white, and at a later period of erosions which bleed easily, and of tallow-like sloughs (talgähnliche Schmiere) which collect round the corners of the mouth.† Röll confines himself to stating that in the first stage of the disease there are "exudations" on the mucous membranes, which are subsequently thrown off or become detached in the form of a pulpy mass, leaving a raw and easily bleeding surface.‡ Jessen in his paper on the diagnostic value of the eruption expresses himself thus:—"The "appearances observed by me on the mucous membrane of the mouth, both in the natural and inoculated disease, are as follows; in some cases small "round nodules, seldom larger than a millet seed, are "observed, which are still covered with epithelium, "through which a yellowish or yellowish grey "material can be distinguished. A few hours later "(sometimes not till twenty-four hours) the epithelium gives way, and the contents become visible; "hence results a very superficial lesion, which after "the removal of the material lying upon it is scarcely "recognizable; it heals in a few days, leaving no "cicatrix. In other cases these nodules become confluent, and then give rise to an excavated ulcer of "considerable extent, with irregular margins, which, "however, usually heals quickly, leaving no cicatrix. "In another form of the affection the epithelium is "raised in the form of small vesicles, which contain "either a clear or slightly turbid fluid, and leave "behind shallow, round excavations, with smooth "edges."§

It must be admitted that with the exception of the last, all the preceding descriptions are so indefinite that it would scarcely be possible for any one who had not seen the local affection to form an accurate conception of its nature. But during the last three years two researches have appeared on the pathology of Cattle Plague in Russia in which the affection of the mouth is described with the greatest care and minuteness, one by Dr. Brauell of Dorpat, who spent many weeks in the Russian Steppes for the purpose of making anatomical, and particularly, microscopical observations; and the other by Professor Rawitch, one of the members of the Russian Imperial Commission on inoculation. According to Brauell the buccal mucous membrane is usually reddened in patches of greater or less extent, these patches being in some places merely deprived of epithelium, in others covered with layers varying in size from that of a lentil to that of a fourpenny piece (Silbergroschen). These layers are of a greyish or yellowish colour, and of irregular form; they project from one to two lines above the surface of the reddened mucous membrane, and are so soft that they can be stripped off readily with the tip of the finger. The membrana propria beneath these layers is more or less reddened by capillary hyperæmia and hæmorrhage, but is usually entire.‖ Similar alterations are found at the margins of the lips and on the snout. In addition to these changes, roundish depressions about as large as a hemp seed, the bases of which were covered with a yellowish material, were observed on the mucous membrane of the lips, and sometimes along with them greyish nodules, which might on superficial examination be easily mistaken for vesicles or pustules. On pressing these, a yellowish, often semi-fluid mass could be squeezed out, leaving behind one of the depressions or pits above described.

The preceding were the appearances met with in animals which had contracted the disease naturally. Those seen in inoculated animals did not materially differ. On the third or fourth day after inoculation there was redness of the gum around the incisor teeth, and more rarely, injection of the mucous membrane of the lower lip. In addition, roundish yellowish specks, as large as hemp seeds, were seen on the upper, and more rarely on the lower lip. At these spots the membrane was covered with a yellowish, white material, which could easily be stripped off, leaving small roundish pits. About the same period of the disease, nodules similar to those above described¶ were observed on the lower lip.

The researches of Professor Rawitch, related to 44 animals under experimental observation at Bondarewka, one of the inoculating stations maintained by the Russian Government near Odessa. On the third or fourth day after inoculation, injection of the gums round the incisor teeth was all that was observed. Two days later elevations about as large as a poppy seed or a hemp seed were observed below the edge of the gum. On the following day or even sooner these had softened in their centres, and were converted into a yellowish white fatty material, on removing which a small round depression was left, the bottom of which was covered with a material resembling pus. On the eighth or ninth day after the inoculation there were patches of the mucous membrane of the gum and lips entirely deprived of epithelium, and covered instead with yellowish grey mucus, or with layers of concretion of tolerably firm consistence.**

The conclusions derived from microscopic examination by Rawitch and Brauell as to the precise anatomical characters of the eruption were the same. They may be stated in substance as follows: the firm elevations which constitute the first appearance of the eruption consist superficially of unaltered epithelium cells, more deeply of similar cells containing large nuclei, and frequently numerous dark granules insoluble in acetic acid. The deepest layers are formed of round granular cells, each containing a large nucleus, and usually three nucleoli, along with which are other cell forms either resembling pus corpuscles or compound granular corpuscles. The laminar concretions consist for the most part of molecular granules and nuclei, along with cells of various forms undergoing molecular degeneration. The membrana propria subjacent to the nodules exhibited in section active proliferation of the nuclei of the connective tissue, which were remarkably enlarged, usually contained several nucleoli, and were here and there distended with collections of small round cytoid corpuscles each containing one to three nucleoli.

My own observations lead me to believe that the alterations of the visible mucous membranes are among the most constant and, for this reason, the most important characters of Cattle Plague. This is particularly true as regards the mucous membrane of the mouth, for in more than 70 cases of the disease which have come under my notice since the commencement of the present inquiry, I have met with only one in which the eruption on the lips and gums, to be described below, was not observed. In all the rest it not only existed but presented itself in a characteristic form. As the case referred to came under my notice at the very commencement of my experience of Cattle Disease, at a time when I was not familiar with the appearances in question, I think it more than likely that I overlooked them. I believe there can be no

* Weber; "Die Rinderpest in symptomatologischer patholog. anatom. und medicinalpolizeilicher Beziehung." Prag, 1852, p. 10.

† Dietrich; "Handbuch der Pathologie und Therapie der Hausthiere." Berlin, 1851, p. 203.

‡ Röll; "Lehrbuch der Pathologie und Therapie der Hausthiere." Wien, 1860, p. 356.

§ Jessen; "Ueber die pathol. Erscheinungen auf der Mund-Schleimhaut in der geimpften Rinderpest und deren Werth für die Diagnose derselben." Dorpat, 1857, pp. 15, 16.

‖ On one occasion only was the membrana propria here and there converted into a soft material, which was found on microscopic examination to consist of fine molecules soluble in ether.

¶ Brauell; "Neue Untersuchungen betreffend die pathol. Anatomie der Rinderpest." Dorpat, 1862, pp. 10–16 and 41–45.

**Rawitch; "Neue Untersuchungen über die pathol. Anatomie der Rinderpest." Berlin, 1864, p. 15 et seq.

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doubt that in animals examined after death, the lips and gums are occasionally found apparently free from disease, but this may be readily accounted for by the fact, that the eruption is of short duration, and that even in fatal cases it often begins to heal within three or four days after its first appearance. I do not venture, from my own experience, to conclude that the eruption is pathognomonic, but I think it highly probable that Professor Jessen, (who has had larger opportunities of observing Cattle Plague than any other man in Europe,) is right in believingthat it is so.

The alterations of the mucous membranes may be most conveniently described with reference to the period of the disease at which they are observed, and the order in which they succeed each other.

In the four inoculated animals of the first series it was impossible not to be struck with the perfect agreement in the time at which the first local manifestations of disease could be detected. All had been inoculated on the Friday evening, and in all, the visible mucous membranes remained absolutely healthy until Wednesday morning. On the evening of the same day all were diseased. The two heifers and the cow showed increased redness of the vaginal mucous membrane, and in the cow, in addition to the change of colour, the surface was sown with greyish white elevations, not so large as pin heads. In all four animals the mucous membrane of the gums, although not perceptibly reddened, was dotted in certain parts in a similar manner. In one case the elevated points were scattered here and there on the upper gum, while in the other three they were met with only on the lower, always occupying the same position, viz., that part of the gum which covers the socket of the corner tooth on either side.

As in these four animals the elevation of temperature which marks the commencement of the constitutional affection had also occurred in each case between forty-eight and thirty-six hours after inoculation, it was evident that a period of two days, or thereabouts, had intervened between this important change and the first appearance of the elevations on the mucous membrane of the mouth. Great care was therefore taken in succeeding observations to inspect the mouth frequently during the third and fourth day of the disease. In four subsequent cases, in which this was done, viz., Nos. 3, 5, 7, and 9, in all of which the disease was contracted by natural infection and terminated fatally, the results coincided exactly, as regards time, with those above referred to, the first changes always occurring, as nearly as could be determined, forty-eight hours after the rise of temperature. In the four cases the first appearances were similar; in three of them nothing was seen excepting groups of punctiform elevations as large as poppy seeds below the corner teeth on each side; in the other, the whole surface of the lower gum and under lip was dotted in a similar manner, but the elevations were more numerous and confluent in the situation referred to than elsewhere. Of the two heifers and the cow, all exhibited general reddening of the vaginal mucous membrane. In one of them it was sown with translucent grey elevated points, and in one of the others a similar appearance was observed on the following day.* It appeared to me very remarkable that, although in several cases, as *e. g.*, in Nos. 8, 12, and 13, the mucous membrane of the mouth was apparently reddened for some hours, or even a day, before the appearance of the eruption, yet in general, this did not seem to be the case. Even when the elevations could be distinguished without difficulty, they were often observed not to be surrounded by any areola of injection; and in several instances I was able to satisfy myself that the colour remained entirely unaltered up to the time immediately preceding this formation. As regards the vaginal mucous membrane it was different, for there, increased intensity of colour appeared not only to precede and accompany alterations of surface, but the injection was much more easy to appreciate, whereas those doubtful pink blushes which were observed in some cases on the gums and lips, and particularly on the papillæ of the cheeks, were often so slight that if one had not attentively looked for them they would have escaped attention.

There were one or two cases in which the granulations differed in character from those usually observed. Thus, in No. 11 they were from the first larger than millet seeds, and formed soft and curdy projections, which, although most abundant in the usual situation, were scattered at intervals over the whole surface of the lower gum and lip. In another case the divergence from the more common appearance was in the opposite direction. On examining the gums at the end of the second day, scarcely any granulations could be discovered, but in their place, viz., below each corner tooth, a group of minute erosions, each surrounded by a fine margin of white opaque material was discovered, the membrane looking as if it had been nibbled by some minute animal. These erosions were surrounded by slight areolæ.

Further alterations in the mucous membrane of the gums and lips.—During the third and fourth days of disease the granulations usually increase in extent, so as to form patches, these either coalescing with other patches of similar origin or remaining distinct. Eventually the mucous surface becomes more or less covered with a curdy or creamy deposit, which is sometimes confluent, at other times discrete. This depends, so far as I have been able to observe, on the number of granulations with which the membrane is dotted in the first instance. If on the fourth day they are sown over the whole of the lower lip and gums, these parts will be found afterwards completely covered with a continuous deposit, almost resembling a false membrane, while, on the other hand, if it is originally confined to the corners of the mouth it will probably become confluent only in those situations, leaving the rest of the surface either clean or sparingly coated.

In general the creamy concretion exfoliates or separates spontaneously a day or two after it is formed. Wherever this takes place, the raw looking bright red surface of the proper mucous membrane (*membrana propria*) is exposed, giving rise to the appearances which, after the author who first described them, have been designated "pestilential erosions of Kausch." Their form and arrangement vary, as may be readily understood, according to those of the patches or concretions by the exfoliation of which they are produced. If the concretions are discrete, the excoriations occupy the centre of each patch, and are of similar contour; and inasmuch as the patches themselves always exhibit a tendency to spread more in a direction parallel to the edges of the teeth than from above downwards, the erosions assume a similar form. If there is a continuous layer of concretion covering the whole surface of the gum, the forms of the original patches can no longer be distinguished. In this case the erosions sometimes appear as irregular fissures, such as might be produced by the mere cracking of the deposit in the movements of the lips; in other instances, the concretions may exfoliate in large flakes, leaving extensive raw surfaces of irregular form. This appears to depend on variations in the character of the deposit,

*In all its stages the affection of the mouth in Cattle Plague strongly resembles the human disease known by the name of muguet or millet. In this disease the first alteration consists of redness of the mucous membrane, then small white grains appear which unite so as to form patches on the surface of the lips, tongue, cheeks, and palate; these exfoliate or detach themselves, leaving an inflamed surface beneath. On the palate they coalesce so as to produce an appearance resembling false membrane, but on the tongue and lips they remain discrete, or if they are so thickly set as to coalesce they still exhibit a granular patchy or uneven appearance, indicating their separate origin. On the cheeks the deposit is soft and curdy. Anatomically this disease has its seat in the epithelium. When the patches peel off, the mucous membrane proper remains intact, and the material peeled off is found to consist of epithelium mixed with the filaments and spores of a hyphaceous fungus. See Dr. Guy's "Vade Mecum," p. 352, and for a more detailed description the article "Muguet" in the "Traité des Maladies des Enfants" of MM. Rilliet and Barthez, vol. 2, p. 210.

those concretions being most apt to exfoliate which are soft and cream like and of great thickness, and vice versâ.

Extension of the morbid process to other parts of the mouth.—During the first day or two after its appearance, no other part of the mouth than the mucous membrane covering the gums and lips is affected. Subsequently similar alterations are observed on the membrane lining the cheeks, on the tongue, and on the palate. As in each of these situations the appearances are different and characteristic, they must be separately described.

(*a*) On the inner surface of the cheek, which is covered in bovine animals with large conical papillæ, many of which are more than a third of an inch in length, the first change consists in a slight reddening of these organs, especially near their tips. In the natural state they are of an extremely pale pink colour, which remains unaltered until the fourth or fifth day of the disease, after which it is more or less intensified. Twenty-four hours later, alterations are observed which are much easier to recognise. The papillæ exhibit sometimes at their tips, sometimes at their bases, minute patches of a deep red colour, and, on examining them with a lens, it is found that these patches are depressed below the general surface, and that they are produced by the stripping off of the superficial layer of the epithelium. At the same time that these changes are taking place in the papillæ, the mucous membrane around their bases becomes coated with deposit of the same nature as that observed on the gums and lips, the only peculiarity being that it is in general softer and more creamy, and so easily detached, that it comes off in large flakes on the fingers.* The papillæ themselves, so far as I have been able to observe, always remain free from concretion.

(*b*) The tongue usually becomes affected a day later than the cheeks. The alterations are confined to the under surface of the organ near its borders, and are of precisely the same nature and appearance as those already described on the lips. On drawing out the tongue, irregular groups of elevated white patches, with or without erosions in their centres, are seen on its under surface near the tip and edges.

(*c*) The hard palate, like the papillæ, remains free from concretions, but in most cases, whether fatal or otherwise, we have observed red depressions, produced by exfoliation of the dense epithelial covering of that part. On the soft palate, the affection again assumes the concretionary form, but here it cannot be advantageously studied during life.

Exceptional appearances and varieties.—With reference to the character of the concretion on the mucous membrane of the mouth, the principal varieties have been already referred to. In some cases the deposit is soft, of great thickness as in No. 11, while in others it is thin and more tenacious. As regards the extent of surface affected and the distribution of the morbid appearances, there are also differences which require consideration. From the examination of the mouths of 35 animals at a farm in Essex, in all of which the disease had arrived at the second or third stage, I obtained the following results as to the relative frequency with which different parts were observed to be affected.

In the 35 animals examined, the mucous membrane below the incisor teeth of the under lip was diseased in 33; the upper lip or dental pad in 26; the papillæ of the inner surface of the cheeks in 28; the lower surface of the tongue in 25; the hard palate in 19. Of the 33 animals in which the lower gum and lip were affected, the alteration consisted in all excepting two cases, of concretions or crusts of the kind described above. In the two referred to, all of the deposits had exfoliated, leaving indistinct red blotches in places previously covered. In 21 of the remaining animals the crusts or concretions were found in great abundance, being at least half a line thick, and covered the whole of the affected surface, and in three others the deposit was equally thick, but occurred in patches. In one case the coating of white material was continuous but remarkably thin, while in the other four the patches were of moderate thickness and varied in arrangement.

The upper lip was coated with an abundant confluent deposit in ten cases, and with distinct patches of a similar character in four cases. In two animals the whole of the upper gum was covered with a thin coating, the remainder showing various intermediate appearances; in one case a single patch was observed.

The papillæ exhibited the bright red excoriations above described in only 11 cases; the creamy or curdy deposit around their roots or bases was seen in 17 cases, in two of which it was remarkably thick and abundant. In the remaining seven cases it was specially noted that the papillæ retained the pale pink hue which is natural to them in health.

Of the 25 cases in which the tongue was affected, the deposit was abundant in nine, inconsiderable in three, the remainder showing various degrees of morbid change.

Exfoliation of the epithelium of the palate was well marked in four cases, less distinct in 13. In the remainder nothing unnatural was observed.

Further alterations of the mucous membrane of the vagina.—Among the experimental animals in the second and third stages of the disease the appearances were as follows:—In those animals that recovered, the mucous membrane was in one instance scattered with miliary elevations similar to those seen on the gums at an early period. In general it was highly injected and smeared pretty abundantly with creamy discharge; but in one case these appearances were very indistinct. In the fatal cases the condition was generally the same, but in three instances the discharge was yellowish and sticky, and in two others there were bright red patches of excoriation here and there, and the whole membrane was roughened as if the epithelium were exfoliating in patches.

In the 35 animals already referred to, which were examined in Essex, we found great varieties in the state of the vagina. Of 34 heifers examined, the colour was more intense than natural in all but one. In many of the cases the discharge was slight. Among 15 cases in which it was considerable in quantity, it was noted that it was creamy in eight cases, watery in one case, tenacious, sticky, or flaky in five cases The mucous surface was either scattered with miliary elevations, or exhibited rough patches of abrasion in 11 cases. In the remainder it was smooth and unbroken. I have never seen on the vaginal mucous membrane any appearance which could be compared to a vesicle.

Disappearance of the concretions, and restoration of the mucous membrane to its natural condition.—In all the animals that recovered, it was observed that the mucous membrane of the gums and lips very rapidly resumed their natural appearance after the completion of the seventh day of the disease, the concretions exfoliating one after another. The newly exposed surfaces, although at first red and raw looking, assume in the course of 24 hours an appearance so nearly natural that it is difficult to distinguish them. This was particularly well seen in the heifer No. 1. In this animal the upper gum was beset on the 6th day of the disease with large patches of concretion. On the following day all of them became detached, and a day later, the places where they had been, did not even differ in colour from the adjoining surface. Those portions of the mucous membrane of the mouth which are later in becoming affected are correspondingly later in beginning to heal. Thus I have found in several instances that the bases of the papillæ of the cheeks and the under surface of the tongue, were still coated, and that the hard palate was still scattered with patches of denudation, two or three

* This is the material described by authors as "talgähnliche Schmiere."

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days after the gums had resumed their natural appearance.

Nature of the morbid process.—The alteration of the mucous membrane of the mouth, like that of the skin, has its seat in the superficial structures. It consists in an altered growth of the epithelium, in virtue of which the epithelial elements are produced in great numbers at its deep surface,—or rather at the surface of the membrana propria,—and of hyperæmia of the last-mentioned structure itself. On examining the white material of which the concretions consist, I have invariably found that they are made up almost entirely of epithelium. In many instances this epithelium does not differ from that which is obtained by scraping the surface of the healthy membrane, but more usually its elements are distinguished from those last mentioned, in the first place, by their relatively small size, and, secondly, by their pale yellowish colour, finely granular contents, and less transparency. They are often very firmly glued together, so that it is difficult to separate them, and are clearly identical with the elements which go to form the deepest layer of the epithelium in the healthy condition. I have not observed the appearances which are regarded by Professor Brauell as indicating that in the incrustations of Cattle Plague, the structural elements are undergoing granular degeneration. It is perfectly true that the bodies above named are commonly associated with masses of a granular interstitial substance, but it does not appear that this can be regarded as abnormal, for granular matter of a similar character is met with in healthy epithelium. Along with and among the altered epithelial cells, I have usually found the filaments and spores of a hyphaceous fungus, analogous, I believe, to those described by M. Robin in the epithelial crusts, which constitute the essential lesion of muguet. I do not for a moment imagine that these spores and filaments have any necessary or invariable connection with Cattle Plague, for I have met with them in abundance in the epithelium of healthy animals.

8. *Alterations of the Alvine Dejections.*

As regards the conditions of the alvine evacuations, I have little to add to the facts recorded by those who have studied Cattle Plague in Russia. The following extract is from Dr. Spinola's Report of the results of his journey inquiry, undertaken by him in 1845, by order of the Prussian Government :—"On the first "day that the animal is obviously ill," (the third or fourth day of the disease, according to my reckoning), "there is usually constipation (erscheint die Mistung "in der Regel verzögert). The fæces are passed "frequently, but in small portions ; these are of firm "consistence and of a dark (blackish) colour, and are "invested with a coating of mucus. The belly is "usually distended, while borborygmi are frequently "audible, especially when the ear is applied to the "abdominal walls. Constipation is soon followed by "diarrhœa, but in exceptional cases the patient dies "before this change takes place. The diarrhœa, "gradually increasing in violence, eventually becomes "dysenteric. The fæces are expelled with expressions "of pain and tenesmus. They are at first watery, "bilious, and green coloured, and have an acid offen-"sive smell and an acid reaction; the fæcal material "being mixed with remains of food. At a later "period they become more and more putrescent, and "acquire an ichorous (jauchig) character and a "yellowish green, brown, or grey colour. In the "last stage the discharges contain much gelatinous "mucus, which varies in consistence, and is usually "mixed with blood partly fluid partly coagulated, in "which case it possesses an extremely stinking smell. "The tenesmus, which was at first observed, gradually "diminishes, and towards the close the sphincter ani "is paralysed. When this is the case, the anus is "protruded, and the intensely dark-red mucous membrane of the rectum is exposed, while the evacuations "are discharged involuntarily."*

This description corresponds in every particular with my own observations, so far as relates to the most malignant cases of Cattle Plague. In these cases constipation was first noticed, as stated by Spinola, on the third or fourth day of the disease, and usually lasted from 36 hours to three days. During this period it was almost always observed that the rounded fæcal masses, which were of an unnaturally dark colour, were glazed or lubricated with blood-stained mucus, small quantities of which were also passed separately. The act of defæcation appeared to be painful and was accompanied with arching of the back and straining contractions of the expiratory muscles, and it was further noticed that the rhythmical contractions of the sphincter, which in bovine animals are always seen for some time after fæces have been evacuated, continued longer and were more vigorous than natural. When the thermometer was introduced, its bulb was firmly grasped by the sphincter, and often appeared to give rise to painful expulsive efforts. Diarrhœa did not in many of the cases commence until the last or penultimate day. It usually came on suddenly, and once or twice it was observed that the first liquid evacuation took place immediately after a mass of solid material had been expelled with great effort, just as if the liquid contents of the small intestine had accumulated in the upper part of the colon, until at length the expulsive power of the expiratory muscles was sufficient to overcome the obstruction. As the fatal termination approached, the alvine discharges became more and more liquid and profuse, at first retaining the odour and character of natural fæces, but soon acquiring a most offensive putrid smell. In the last stage the consistence of the liquid varied from that of pease soup to that of rice water. Eventually it consisted only of mucus and blood, in which case, as stated by Dr. Spinola, its odour was peculiarly offensive. The colour varied according to the quantity of blood contained in it. It was usually very pale, but not so pale as the dejections of cholera, which in general it strikingly resembled.

Among the animals that recovered, constipation commenced on the same day of the disease, as in the fatal cases, and continued for three or four days, after which it was succeeded by diarrhœa. In some of these cases, the tonic contraction of the sphincter, the tenesmus and straining were nearly as marked as in the animals that died; but the hard fæcal masses were never coated with mucus. The diarrhœa was also of short duration, never lasting more than four days. The evacuations were throughout of natural colour, and never acquired the dysenteric characters, which have been described above.

9. *Alterations of the Skin.*

The frequent occurrence of eruptions, incrustations, and other alterations of the skin in Cattle Plague is referred to in all modern descriptions of the disease. Seer,† one of the best writers on the subject up to his time, speaks of a pustular eruption on the shoulders as occuring in some animals after recovery from Rinderpest, but in most cases he says, that "the eruption "had already dried into brown crusts, by which the "hair was matted together in tufts." Falke‡ states that in some, but not in all epizootics, an eruption (Exanthem) appears on the neck, back, and tail, either about the third day, or at the acme of the disease. The hair of the affected parts stands on end, and on feeling the skin the finger encounters ridges of tubercles (Bläschen, Friesel, Ramazzini-pocken), which soon form crusts, matting the hair together. Professor

* Spinola, in loc. cit., p. 107.

† Seer; "Ueber die Rinderpest der Jahre 1844 und 1845, in Böhmen." Ztschft. für Thierheilk. von Dieterichs, Uebel und Vix, Bd. XIV, p. 1, 1847.

‡ Falke ; "Handbuch der Krankheiten unserer nutzbaren Hausthiere." Erlangen, 1858, p. 611.

Röll* in his well known hand-book states, that in Austrian cattle, although the skin is dry and parchment-like, and beset with incrustations, scaly or pustular eruptions are rarely met with; but among cattle imported from Russia (Pusstenvieh) such eruptions occur frequently, and sometimes constitute the most striking features of the disease. Wirth,† in his "Seuchenlehre," also refers to the occurrence in certain districts of an eruption similar to that described by Ramazzini.

Rigoni found that in convalescent animals "there "appears on the nucha, back, shoulders, and other "parts a pustular exanthema, containing an unctuous "or purulent liquid, which as it dries assumes the "form of crusts united to the skin. Even when "the exanthema does not appear, there exudes on "the surface of the epidermis in every part a furfuraceous or powdery substance, which occasions "the animal much itching." From this pustular eruption he remarks, the variolous nature of the disease has been inferred.‡

Dr. Weber, who enjoyed large opportunities of investigating the disease in Galicia in 1851, and has published the results of his observations in an excellent paper, appears to have studied the alterations of the skin with great attention. He describes the incrustations on the neck and shoulders as giving to the finger the impression of parallel ridges of tubercles, the general direction of which is vertical, but as being found on more close examination to be no more than crusts having hairs embedded in them, and points out how the rugose condition is produced by the movements of the animal. On removing these crusts, the hair is removed along with them, sometimes exposing a shallow ulcerated surface covered with whitish exudation, sometimes a true scar of circular form.

But in addition to this appearance, which one at once recognizes as identical with those which have been observed in this country during the present epizootic, Dr. Weber describes a "pustular eruption" as occurring "here and there." In one animal, he had the opportunity of studying these pustules in the recent state, and "was able to squeeze out of them "by slight pressure a tolerably consistent yellowish "purulent material. These pustules," says he, "constitute the exanthem of Rinderpest, which has "already so often given rise to erroneous speculations."§ He then refers to the great epizootie of 1709 and to the views of Ramazzini and his followers, who regarded the disease which then prevailed as identical with smallpox.

Professor Brauell of Dorpat, to whose comprehensive and exact treatise on the pathological anatomy of Rinderpest I have already referred, did not fail to describe the appearances observed on the skin, which he noticed almost exclusively among animals to which the disease had been communicated by inoculation. "In many inoculated animals I ob- "served the elevations on the surface of the skin "which have been described by other authors as "crusts, eruptions, &c. These were to be found in "the neighbourhood of the anus, and lower down "nearer the scrotum, on the surface of that organ "(very frequently), or on the inner surface of the "thighs. They consisted of small heaps of a dark "or yellowish colour, according to the dark or yellow "colour of the skin on which they were placed. They "varied in size from that of a small hempseed to "that of a pea, projecting one or two lines above the "surrounding skin. They were rough on the surface, "and were sometimes of firm consistence, sometimes "soft. They could be easily removed, leaving behind "them the subjacent skin, reddened and without "visible vessels, but always without loss of substance. "On microscopic examination it was found that the "more firm of these elevations consisted superficially "of polygonal cells, while their deeper layers were "formed of round cells with granular contents. The "soft variety contained the same elements, more or less "disintegrated, and mixed with molecular material. "In the *corpus papillare* of the parts of the skin "where these elevations abounded, small extravasations were found. Several times finely molecular "deposits were found under the elevations in the "superficial layer of the *corpus papillare*, which "were evidently due to disintegration of the tissue, "and I do not doubt that sometimes loss of substance "occurs such as might be designated by some "observers ulceration. Pustules (which are said "by many authors to occur) I have never seen. I "presume that those elevations which, when they "are yellow and involve the deeper layers of the "skin, have some resemblance to pustules, have been "mistaken for them."‖

The appearances I have observed on the skin in animals affected with Cattle Plague are very various, and seem at first sight to have little relation to each other. They may, however, be described generally as consisting, in the first place, of *incrustation* of material exuded in a soft or semisolid state from the glandular follicles of the skin, and, secondly, of pathological changes in the superficial structures of the skin, which, without taking anything for granted as to their nature, may be designated by the term eruption.

1. *Incrustation.*—The earliest appearance or rather change I have noticed consists in the exuding of a semisolid material on the surface of the skin, whereby it is rendered unctuous to the touch. This I have observed, about the 4th or 5th day, on the insides of the thighs, in the immediate neighbourhood of the anus and vulva, and on the chin. In the course of a day the exudation concretes (unless the part is smeared by discharges) into a dry crust of a pale or canary-yellow colour. According to the situation in which it is found, its characters and appearances differ.

(*a.*) On the inside of the thighs and on the udder or scrotum of young animals, I have met with the incrustation more frequently than in any other part and here it always assumes the appearance described above, the only difference being that in the neighbourhood of the vulva the crust is continuous, whereas in other parts it is more or less broken into fragments or furfuraceous.

(*b.*) On the nucha and sides of the neck, where the incrustation is often thicker and more abundant than anywhere else, it forms a thick and tough coating, by which the hair is firmly welded together. In this condition it reminds the medical observer of the appearance of the human scalp when affected with eczema. The encrusted part always exhibits numerous furrows or rather fissures parallel to each other, in which the cuticle is as it were cracked through, exposing the vascular cutis. With this exception, I have not been able to detect any evidence of disease of the subjacent structures; but from analogy, as well as from the descriptions of other writers, I presume that a similar condition of the cutis exists to that which is observed in other encrusted parts.

(*c.*) On the udder of milk cows, when the eruption, to be hereafter described, is present, the incrustration is incorporated with the softened, thickened, and half detached epidermis, so that it is difficult, except at the commencement, to detect it. At the edge of the diseased parts it assumes the same colour and appearance which is observed on the udders of immature heifers.

(*d.*) On the chin and around the mouth the crust also exhibits peculiarities, epecially in those parts which are kept moist by the constant smearing of the surface with mucous discharges from the nares and mouth. Here it forms a thick deposit, of a colour varying from dirty white to dirty yellowish brown. It is very readily scraped off in soft masses, but in

* Röll; "Lehrbuch der Pathol. der Hausthiere;" p. 356.
† Wirth; "Seuchenlehre;" p. 168, Zürich, 1846.
‡ Rigoni; "Corso di Nosologia Veterinaria;" tomo 2do, p. 83. Florence, 1852.
§ Weber, loc. cit., p. 7.
‖ Brauell; "Neue Untersuchungen," p. 52.

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doing so it is difficult to avoid removing at the same time the softened, thickened epithelium, which is incorporated with the crust, as well as the hairs loosened by the alterations to be described below.

2. *Eruption.*—Before discussing the nature of the alterations which constitute the "eruption," it will be most convenient to state in what parts of the cutaneous surface they are, so far as I have observed, exclusively met with. They occur on the chin and around the lips, on the perinæum, and particularly on the udder of milk cows around the bases of the teats. They consist, first, of thickening, softening, and detachment of the epidermis, and, secondly, of elevations of the surface of various forms.

Detachment of the epidermis is observed in all the affected parts. Around the mouth it is often seen in the advanced stages of the disease very distinctly, from its giving rise to red excoriations which extend to the skin and to the bordering mucous membrane. These are edged with loosened, thickened, encrusted epidermis, and are frequently seen to be continuous with the soft creamy apthous patches and excoriations with which the inside of the under lip is usually covered at the same period. On the perinæum the epidermis becomes dry and crumply, and usually the superficial layers (scurf skin) peel off with great readiness, leaving the reddish surface of the deeper layers uncovered. On the udder of milk cows it is also very readily detached; towards the upper part of the udder it is dry and crumply, and, as already stated, more or less incorporated with incrustation.

The *elevations* I have observed are of three kinds:

1. Soft papular elevations, described by various authors as Knötchen or Höckerchen.
2. Hard crusted elevations, somewhat resembling impetigo-pustules, and met with only on the udders of milk cows.
3. Soft tubercles of larger size than the first, due to the enlargement and inflammation of sebaceous follicles.

1. The papular elevations are met with only in a certain number of the cases in which the epidermis is more or less diseased; and when they occur they are often to be found only here and there on the affected parts. They are of circular contour, and of a flattened or rounded (rarely conical) form. When pressed upon by the finger, they feel soft or pulpy, but never fluctuating. On section, each is found to consist of a soft core, which lies immediately on the vascular surface of the corium or corpus papillare, and is covered superficially by a crust of firmer consistence. When the elevations are cut into, no liquid serum or juice of any kind escapes; but it is easy to enucleate the central core, and submit it to microscopic examination.

On the chin the elevations lie under the general incrustation, but are readily felt by the finger. In this situation they are often found surrounding a single hair or a group of hairs, which then converge together so as to form a tuft or pencil. Whenever this is the case the bulbs of the affected hairs become diseased. They lose their attachment, and if the crust is removed are drawn out of the cavities they occupied in the corium, without the slightest resistance. On examining these bulbs each is found to be surrounded with the bunch of sebaceous follicles which belong to it and both hair bulb and follicles are found to be invested with a pulpy material, which is continuous with and evidently of the same nature as that which lies under the superficial crust.

On those parts of the udders of milk cows which are covered with hair, the characters of the papular elevation do not differ from those above described, but at the roots of the teats, where there are scarcely any hairs, they present a somewhat different appearance, which it is principally important to notice, because it has led to their being erroneously described as "flattened vesicles." These bodies are often seen in numerous groups in the above-mentioned situation. They are relatively larger than the elevations seen in other parts, few of them being less than a fifth of an inch in diameter. On their convex surfaces the epithelium is either broken up or completely detached, in which case the smooth denuded surface is surrounded by a raised border corresponding to the line along which the cuticle surrounding the elevation is still adherent to the deeper structures. When examined after death they exhibit at first sight a striking resemblance to vesicles, and this appearance becomes more deceptive when, as is sometimes the case, a central depression somewhat like that of the vaccine vesicle is observable. But on section in the perfectly recent state or during life they are at once shown to have precisely the same structure as those already described.

In those animals that I observed during recovery, the eruption on the skin disappeared, leaving no trace behind it. The epidermis desquamated, and the crusts of the papular elevations scaled off with it. Whether the hair came off at the same time I am unable to state. I have not had the opportunity of observing any animal during recovery in which the eruption existed on the udder.

2. The hard, crusted elevations are met with in certain cases on the udders of milk cows intermixed with the ordinary form of eruption, but in no other situation. In the cow No. 5 this condition was carefully studied, and I have since had the opportunity of examining two other cases, in which there were crusts having beneath them collections of a material resembling in appearance concrete pus. Between the teats of the cow referred to, the ordinary papular elevations existed in great abundance, and towards the fatal termination of the case gave rise to the production of hard dark-coloured crusts, some of which were as large as a six-penny piece. Beneath each of these crusts it was found, on examination after death, that there was a collection of tenacious pale yellow puriform material, sufficient to communicate to the finger a distinct sensation of fluctuation when pressed against the deep surface of the detached skin subjacent to the little abscess. On cutting into the cavity in which this matter was contained, it did not, however, flow out, but was discharged en masse.

3. The larger tubercles, which consist of single dilated sebaceous follicles, choked with secretion, and more or less inflamed, are met with in various situations. I have found them on the insides of the thighs, and on the perinæum, but most frequently on the udder. In some cases the contents of the gland soften, and are converted into a puriform liquid. I do not imagine that they have any special relation to Cattle Plague.

In order to complete the description of the cutaneous affections, it is necessary to refer to certain unusual appearances, which, although belonging to the same order of morbid changes, do not come under any of the heads hitherto considered. I allude first to the occasional formation of superficial ulcers in the neighbourhood of the mouth, and to the existence (in one case) of petechiæ on the skin.

In two of the inoculated yearlings that recovered, superficial ulcers were formed during the decline of the disease, near the angles of the mouth and on the chin. They were very irregular in outline. None of them exceeded a threepenny-piece in diameter. They were always surrounded by a tumid margin, which was raised not only above the ulcerated surface but also above the surrounding skin, so that although they appeared to be deep they were in reality very superficial, not penetrating below the level of the epidermis. Of this fact, of which it was easy to satisfy oneself by careful examination, the rapidity with which the sores healed afforded additional evidence.

In the bullock No. 3, there were dark spots resembling petechiæ scattered irregularly over the diseased surfaces. These spots did not appear, or at all events did not become so obvious as to be distinguished from other appearances due to the eruption, until a short time before the death of the animal. They seemed to be confined to the diseased integument surrounding the vulva and anus, where the epidermis

was already loosened and in places detached from the cutis. Microsopic examination showed that the dark colour was dependent on the existence of aggregations of blood-pigment granules beneath the surface of the true skin, and especially around the ducts of the sebaceous follicles. These were of a brownish or Indian red colour, not enclosed in any cell wall, but apparently imbedded in the connective tissue of the true skin.

Having now described the general appearance of the eruption, I am in a position to discuss its pathological character, with reference particularly to the nature of the changes in the superficial structures of the skin which lead to the disintegration and detachment of the epidermis, and to the origin and formation of the papular elevations.

From the examination of the diseased skin during life and after death, I have arrived at the following conclusions:—

1. In those parts of the integument in which the epidermis is detached or disintegrated, the vascular layer (*corpus papillare*) is more richly supplied with blood than in healthy parts. I have, however, seen no indications of reddening of the surface (roseola), excepting on the udders of milk cows, and in this situation, only at a period shortly preceding death.*

2. In recently diseased parts I have found the deep layer of the epidermis thickened and softened, or rather replaced by a layer of pulpy material, which on microsopic examination was always found to consist for the most part, of nuclear corpuscles varying in diameter from $\frac{1}{3000}$ to $\frac{1}{1500}$ of an inch. These adhered closely to each other, and consequently assumed a somewhat angular form, which they retained even when separated by manipulation. When treated with weak acetic acid they were but little altered, merely acquiring greater sharpness of outline, and appearing smaller. In this and in all other respects they resembled those which are to be found normally at the deep surface of the epidermis, more than any form of pus or exudation corpuscle.

3. The same pulpy material is not only to be found between the corpus papillare and the loosened epidermis, but invests the hair bulbs and sebaceous follicles so as to separate them from the cavities in the cutis in which they are lodged. Of these facts one can readily satisfy oneself during life by removing the superficial crusts of a few of the papular elevations on the udder or around the lips, and examining the hair bulbs which are drawn out with them. The pulpy material which adheres to the bulbs and follicles is then found to have precisely the structural character described in the last section.

4. The soft masses or cores which can be picked out of the centre of the papillary elevations consist of corpuscles of the same nature, the only differences observed being, that in some they are intermixed with a considerable number of granules, and appear to be themselves undergoing disintegration.

5. With the exception of certain anomalous appearances, which are rather to be regarded as secondary effects or complications, than as parts of the morbid process, the alterations of the skin which are observed in Rinderpest, appear to be referable to one primary lesion, viz., to the exuberant growth or multiplication of nuclear corpuscles having no tendency to undergo transformation into normal epidermal structure.

6. The alterations of the skin and of the visible mucous membranes are identical, for in both, the corresponding structures undergo similar modifications. That this is so, we have direct proof in the often-repeated observation that the morbid process which commences on the lips creeps round the corners of the mouth, and spreads thence to the cutaneous surface, the aphthous crusts on the former becoming, as has been already stated, continuous with similar patches of softened and thickened epidermis.

7. The affection of the skin in Cattle Plague presents certain analogies with those observed in the eruptive diseases to which man is liable; but in each case the points of difference are so much more numerous and striking than the resemblances that it seems unnecessary to discuss them.

*See Fig. 3.

10.—*Alterations of the Functions of the Brain and Nervous System.*

None of the cases I have had the opportunity of observing, affords any evidence that Cattle Plague interferes with the functions of the nervous system. Neither sensation, voluntary motion, nor consciousness, appears to undergo any modification, excepting in so far that in the last stage of the disease, in fatal cases, tremors and muscular twitchings are usually met with and that during the same period there is extreme muscular weakness. Convulsions have not occurred, nor have there been the slightest indications of delirium in any of the animals. The increased sensibility or tenderness of the surface on either side of the lumbar vertebræ, a symptom which has been referred to by the greater number of continental writers, I have watched for, but have failed to observe in a single instance.* If, therefore, I were to judge from what I have seen myself exclusively, I should be disposed to found a distinction between Cattle Plague and other toxæmic diseases, on the ground of the freedom of the animals affected from symptoms referable to the nervous system, and to believe that the poison exercises little if any special or direct influence on the nervous centres. Such a conclusion would probably be erroneous, for although in some countries and in some epizootics the same immunity from derangements of innervation has existed as in this country, there is evidence to show that this is not the case universally. To illustrate this, I propose to refer in some detail to the writings of the best Russian and Austrian authorities.

Oberthierarzt Haupt, who was sent by the Russian Government in 1810 to Irkutsk in Siberia and subsequently to Tobolsk, for the purpose of taking measures for the prevention of epizootics in that country, has written an exhaustive and thoroughly original work on these diseases, with special reference to Rinderpest. It is remarkable that his description coincides more closely with our English experience than any other that I have met with, thus showing how little the disease appears to be influenced by the most opposite conditions of climate and the greatest diversity of external circumstances.

"The disease could be recognized" says Haupt† "at its earliest commencement, only by the animal "losing its contented expression and accustomed live-"liness. In almost every instance I have observed "from the first, that general diminution of strength "and depression which characterized the disease "throughout. I remember no instance in which the "disease commenced with the contrary condition, that "of excitement; the affected animals never exhibited "any indications of wildness, nor did I ever notice a "sparkling appearance or inflammatory redness of the "eyes, a staring aspect, or increased heat of the mouth, "as the first symptoms. I do not know of any case in "which there was excessive liveliness, bellowing or "the like, either at the beginning or during the "progress of the disease. Febrile accessions were "observed only in a few animals, and for the most "part in the advanced stage. Death occurred without "any marked convulsion; usually it was preceded by "slight twitchings, the animal stretching out its limbs "and moaning as it expired."

In the above remarks, Haupt probably refers to the observations which had been made during the previous year in Bohemia by Thierarzt Seer, who was sent by

* My friend, Mr. W. A. White, H. M.'s Consul at Dantzic, who, although not an expert, has become expert in Cattle Plague by observation during many years residence in Russia, was at once struck, on visiting our experimental stable the other day, by the absence of this tenderness of the loins, which he told me occurred so constantly in Poland as to have become familiar to the country people as a sign of the disease.

† Haupt; "Ueber einige Seuchenkrankheiten der Hausthiere in Sibirien." Berlin, 1845, p. 241.

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the Prussian Government to investigate the epizootic of Cattle Plague which prevailed in 1844 throughout Bohemia, and other of the northern provinces of Austria.

According to this writer whose experience extended to 800 cases, "the earliest manifestation of the disease "consists in a vigorous re-action of the organism in "the form of a synochous fever, the onset of which is "sometimes indicated by rigors so violent as to make "the animals' (chain) halters rattle; sometimes by "slight shiverings, or even by great prostration or "nervous excitement." After a period varying from 24 to 48 hours, the synocha passes into well-marked torpor. The visible mucous membranes become soft and moist, the eyeballs, which were at first prominent and sparkling, sink into their sockets, while the corneæ look dull and are often smeared with mucus, &c.*

Dr. Ritter von Koch, who was commissioned by the Austrian Government in December 1853 to inquire into a later epizootic which then prevailed in the same provinces of Northern Austria, describes the initial symptoms which occur in certain cases in terms which closely agree with those employed by Seer.

According to Dr. von Koch two varieties or forms of the disease may be distinguished. One of these seems to agree, both as regards the general character of the symptoms and the alterations of the mucous membranes, with the cases observed in this country; but in the other, the disease comes on with greater violence, and its progress towards the fatal termination is more rapid, while the mucous membrane of the mouth, instead of exhibiting the ordinary aphthous concretions is "smeared "with an abundance of foamy or tenacious mucus, "and is in some parts much reddened" (p. 87). In these rapid cases, says our author, "the phenomena of "fever presented themselves in great intensity at the "outset. There were frequent and violent tremors of "the hide, and the head vibrated whenever the animal "was standing, but not when it was lying; twitchings "of the muscles were however observed in the flanks "and belly, which became more marked as the disease "progressed. There was usually horripilation either all "over or in particular parts, but in some cases the hair "remained smooth. The eyes were at first sparkling, "and had a staring anxious expression, but subsequently "acquired a dull, muddy, and sunken appearance. The "conjunctivæ were at first much reddened, afterwards "usually livid, &c." According to Dr. von Koch the cases in which these remarkable symptoms present themselves are always characterized by "the absence "of membranous or coagulable exudative masses," and by intense hyperæmia and softening of the mucous membranes.†

Dr. Spinola,‡ to whose investigations I have already had occasion to refer, tells us that Cattle Plague usually commences with a *stadium prodromorum*, characterized principally by "alteration of the habits and demeanour of the animal," particularly by "depression, dulness, and diminished liveliness, and sometimes by great restlessness and excitement." With these symptoms are associated anorexia, irregularity of rumination, diminution of secretion, constipation, and all the other phenomena we have observed during the third or fourth day of the disease. About a day later, "fever "sets in with partial or general tremors (Zittern) of "the body and horripilation (Sträuben der Haare), "the ears lying back loosely against the head, which "hangs down and oscillates with the violence of the "shivering." As the disease advances, other nervous phenomena present themselves which are no less characteristic. "The lumbar region becomes more "and more sensitive, although at last this condition "is concealed by the increasing weakness and ap- "proaching paralysis." At the same time the animals evince great restlessness. "They have a bewildered "aspect and terrified demeanour, while they listen "anxiously, snort, and toss their heads. The seat of "pain seems to be the belly, for the suffering is most "apparent before and during the alvine evacuations. "There are frequently convulsive muscular movements "of the hind limbs, which last for a longer or shorter "period, sometimes continuing until death. Other "convulsive phenomena are wanting, or, at all events, "are of rare occurrence. The bending of the neck "to one side, and the peculiar attitude of the head, "are rather the results of relaxation than of spasm. "The tremors, however, which occur in the first "stage often pass into twitchings which may be "either partial or general. In the latter case, jerk- "ing movements of the body are produced which "resemble those of hiccough in man. These phe- "nomena commence about the third (fifth) day. As "death approaches, the muscles become flaccid and "powerless."

The only writer I have met with who refers to cerebral symptoms is Dr. Weber, to whose report on the disease in Galicia I have also before referred. "It does "not admit of a doubt," he says, "that the functions "of the brain are affected by the disease. From the "very commencement, the animal becomes indifferent "(theilnahmslos). It lies still and cannot be made to "get up even by poking it in the most decided manner, "yet notwithstanding sometimes suddenly rises and "walks about heavily. It does not get out of the way "when another animal stands immediately before it, "while, on the other hand, it butts with its horns as if "attacking some imaginary object (vielleicht Hallu- "cinationen des Gesichtes)."*

11. *Diagnosis of Cattle Plague.*

No method of diagnosis can be of much practical value with reference to a contagious fever unless it is founded on the observation of the earliest symptoms, not only because at a later period the nature of the disease becomes so plain as not to admit of question, but because the utility of knowing what is the matter, whether with a view to prevention or treatment, depends upon the time at which that knowledge is acquired.

The method of diagnosis to be employed must differ according to the circumstances. In the case in which it is necessary to recognize the disease in animals not known to be subject to infection, those characters only are available which it possesses exclusively of all other febrile affections. When on the other hand, all that is required is to recognize it in infected herds or stables, the value of the indications depends much more on their appearing early and their being readily observed. For in the latter case it may be presumed that if any of the usual symptoms of fever manifest themselves, it is infinitely more probable that they are due to the particular fever to which the animal has been exposed than to any other.

Among the early phenomena of Cattle Plague, diagnostic signs are to be found which are available in both of these cases.

Just as smallpox is distinguished exclusively by its eruption, erysipelas by the inflammation of the skin, diphtheria by the membranous concretion on the fauces, so Cattle Plague may be discriminated from all other diseases whatsoever, by the alterations of the visible mucous membranes generally, and particularly by those of the lips and gums. For the appearances to which these changes give rise are so characteristic and at the same time so constant, that I do not feel the slightest hesitation in saying that, with their aid alone, any man of ordinary capacity who has carefully studied them *in living animals*, can recognise the

* Seer, in loco citato, p. 5.

† Von Koch; "Beobachtungen über Rinderpest, gesammelt während der Verwendung bei diese Seuche in Mähren, im J. 1853–54. Vierteljahrschrift für Veterinärkunde, Bd. V. s. 13, 1854." This report is founded on the observation of 180 cases and 96 dissections.

‡ It should be remembered that the commencement of the disease according to Dr. Spinola corresponds to the 3rd day of its progress.—Spinola; "Handbuch der speciellen Pathologie und Therapie." Bd. I. pp. 293, 294.

* Weber, loc. cit., p. 16.

disease with certainty during the third or fourth day of its progress.*

In like manner, the increase of temperature, which my observations have shown to be the earliest sign of Cattle Disease, is an invaluable means of determining the time at which an animal exposed to infection becomes actually infected. If, as I confidently hope, a method of cure for Cattle Plague shall ultimately be discovered, it will enable the veterinary practitioner to commence his treatment while the animal is still in the full exercise of its healthy functions. It is very possible that the resources of art may still fail as they have hitherto failed to enable him to drive the disease out when once established, but it does not seem unreasonable to hope that if he is placed in possession of the ground before the enemy approaches, he may be able to hold it.

Phenomena of Cattle Plague in Sheep.

The fact that sheep are liable to be affected by the poison of Cattle Plague, and that the disease assumes in these animals a form similar to that which is observed in horned cattle, was first established in the year 1861 by the simultaneous but independent observations of Dr. Maresch at Prague and Dr. Galàmbos of Pesth. Dr. Maresch concluded that the disease in sheep was not capable of originating spontaneously in these animals, but that it was communicable from one animal of this species to another, and probably also from the sheep to the ox ; and that the ovine disease ran its course much more mildly, a large proportion of the infected animals recovering.† Before this period the disease appears not to have been recognized, for Röll, in his Handbook, published in 1860, states positively that no species excepting the ox and the buffalo is capable of being infected with the Cattle Plague.

In the spring of 1863, when plague prevailed among cattle in various parts of the Austrian province of Illyria, on the frontier of Croatia, it happened in several of the villages that sheep were accidentally brought into contact with diseased cattle, and thereby infected. A commission was immediately appointed by the Austrian Government for the purpose of studying the disease on the spot, and of ascertaining more precisely its relations to the bovine malady, the Commissioners being Professors Röll and Bleiweis. The following symptoms were observed in ten affected animals in various stages of the disease :—" Dullness, " loss of appetite, cessation of rumination (rarely " cessation of both functions). The ears hang back, " and are cold to the touch. The animals affected " look sad, turn their heads into a corner or towards " a wall. The eyes are dull and glazed and the " conjunctivæ reddened, the secretion of tears being " usually excessive. The mucous membrane of the " nose is injected and often exhibits excoriations ; " occasionally it is smeared with liquid mucus of a " greenish yellow colour streaked with blood. The " discharge from the nose dries on the alæ, so as to form " dirty crusts. The lower gum becomes livid and the " flow of saliva is increased. The pulse is accelerated " (120) and the impulse of the heart excessive. The " breathing is embarrassed and gasping and is accom- " panied with a short hollow cough. As early as the " second day excessive diarrhœa supervenes. The " evacuations are of fluid consistence, dark green " colour and offensive smell, and are often expelled " with great violence. If the diarrhœa continues, the " animal dies two, three, or four days after the first " obvious symptoms, death usually occurring quietly " but being sometimes preceded by convulsion. If it " ceases, the animal begins to ruminate and regains " its appetite and liveliness, and the morbid discharges " from the mouth, nose, and eyes diminish."‡

The identity of this disease with Cattle Plague was at once recognized by the Commissioners,§ but it was resolved, in order to establish it in a positive manner, to inoculate bovine animals from the diseased sheep. At Preloka, one of the plague-stricken districts, four oxen were inoculated, one with blood, the others with mucus taken respectively from the intestines, nostrils, and air passages, the insertions being made either by seton, puncture, or by rubbing the virus on the mucous membrane of the nose. Only one of these inoculations, however, succeeded, and the animal died. In another district, Zagorje, three cattle were inoculated with mucous discharge and with blood which were taken from a sheep at the last stage of the disease. On the ninth day after, one of these animals, a cow, became ill, and died with all the symptoms of Rinderpest. The other two did not show any symptoms till 19 days after inoculation, so that it was evident that their infection was due not to the inoculation, but to their being placed along with the cow first attacked. These two also died. In all four cases the dissections which were made after death showed that the characteristic lesions of Cattle Plague were present.

These experiments are thought by Dr. Bleiweis to afford evidence that the contagion of the plague in sheep, when transmitted to cattle, does not produce a mild form of the disease, for in one of the animals in particular, both the appearances during life and the lesions found after death were of extreme intensity. This conclusion is confirmed by the experiment made by me last November at the Royal Veterinary College, the details of which are recorded in the Appendix (Case No. 23).

Of the four sheep which were purchased for experiment, as stated in the introduction to this Report, two were inoculated on the 1st of December without effect,‖ the matter used being the same which was employed for the inoculation of the cattle of the first series. They subsequently remained in the same stable with the diseased animals, but exhibited no symptoms of Cattle Plague. The other two, a ewe and a ram, which had been kept in a separate stable until the 20th of December, were on that day placed in the stall previously occupied by the bullock No. 3, which had died on the 19th, after which time periodical observations of pulse, respiration, and temperature were taken daily. The ewe showed marked increase of temperature on the 27th, the ram on the 30th of December.

* The only affection in which appearances present themselves having any resemblance to those seen in Cattle Plague is foot and mouth disease (*aphthæ epizooticæ*). In this disease about the third day after the first febrile symptoms, white or yellowish white vesicles, which are at first as large as hemp seeds, but subsequently attain the size of peas or hazelnuts, and become confluent, appear on the mucous membrane of the mouth, particularly on the lower lip, on the dental pad, on the edges of the tongue, and on the palate, that is, in precisely the same parts which are affected in Rinderpest. The essential distinction lies in the fact that in Cattle Plague there are no vesicles.

† Maresch ; "Infection des Schafes durch das Rinderpestcontagium." Oesterreich. Vierteljahrschrift für Veterinärkunde, xix. Bd., p. 34.

‡ Bleiweis ; "Die Identität der Rinder- und Schafpest durch Impfversuche constatirt." Vierteljahrschrift für Veterinärkunde, xxi. B., p. 15.

§ On this subject Professor Röll remarks : "The appearances found in diseased sheep during life and after death differ from those seen in plague-stricken cattle in one particular only, viz.: that in sheep, foci of inflammation are almost always found more or less numerously distributed in the lungs. The progress of the disease is further much milder in sheep than in cattle." The author supports this statement by a summary of the number attacked and cured in various provinces of Austria, which shows that among 1,084 sheep attacked, 442, or 41 per cent. recovered. —Röll ; "Bemerkungen über die Rinderpestähnlichen Erkrankungen der Schafe." Oesterreich. Vierteljahrschrift für Wissenschaftl. Veterinärk., xxi. B., p. 175.

‖ Plague has been produced in sheep by inoculation from diseased cattle both in England, and in Russia at the Inoculation Institution of Cherson. The effects produced correspond very closely with the symptoms described in the text in sheep naturally infected. In three sheep inoculated on the 15th of August 1863 at the Inoculation Institution at Cherson, redness of the conjunctivæ and of the lips was first noticed in each case on the 5th day after the operation ; soon after there was discharge from the nares, and the breathing became difficult and puffing. On the next day minute elevations were observed on the mucous membrane of the lips, and soon after there was discharge from the eyes and nostrils ; in the course of few days the eruption rapidly disappeared.—Report of Imperial Commission on the Inoculation of Horned Cattle, &c. Petersburg, 1865, p. 261.

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The daily observations which were made after these dates are recorded in the following table, and correspond closely with those already tabulated relating to bovine animals.

TABLE showing the Average Number of Pulsations and Respirations per Minute, and the Average Temperature in Two Sheep in the healthy State as compared with the Means of the daily Observations taken during the Progress of Cattle Plague.

Description of Animal.		Averages during Health.	1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	6th Day.	7th Day.	8th Day.	9th Day.	10th Day.	11th Day.	12th Day.
No. 1. An ewe affected with Cattle Plague in consequence of having been kept during seven days in a stall previously occupied by a bullock which had died of the disease.	Pulse -	59·1	58	66	61	69	69	62	61	64	60	56	56	—
	Resp. -	23·6	28	30	43	32	33	26	25	27	20	20	28	—
	Temp. -	103·2	103·4	103·9	105·1	104·8	105·2	102·9	102·4	103·4	103·3	102·6	102·4	—
No. 2. A ram affected with Cattle Plague after having been kept for ten days in the same stall.	Pulse -	61·9	71	73	68	66	69	82	109	115	97	113	117	108
	Resp. -	21·6	25	26	22	23	20	21	26	20	18	20	25	23
	Temp.-	102·7	104·3	104·9	104·9	105·0	104·8	104·0	105·2	104·7	104·7	105·1	105·1	104·2

During the first six days of the disease, as I have observed in cattle, the pulse was slightly quicker than in health. Subsequently it gradually returned to its normal standard in the ewe, but in the ram it became much more frequent. The cause of this acceleration was not ascertained, but from its long continuance it seemed to me to depend on some unknown supervening complication by which the febrile condition was kept up. The respiration columns exhibit nothing remarkable in either animal. In the ewe the elevation of temperature lasted only until the fifth day, but in the ram it persisted long after the specific symptoms of the disease had disappeared, in common with anorexia, quick pulse, and other signs of exhaustion.

The visible mucous membranes underwent alterations which corresponded in every respect, both as regards the parts affected and the extent and duration of the morbid changes, with those which characterise the disease in cattle. The first alteration consisted in the appearance on the third day after the rise of temperature of minute scattered elevations on the slightly reddened surface of the gums and under lip, these elevations enlarging into patches and becoming more or less confluent just as they do in cattle. By the fifth day the eruption had arrived at its height; in the ewe the patches on the lower gum were still for the most part discrete, each patch having in its centre a bright red abrasion, bordered by a raised margin of creamy concretion which could be easily detached. In the ram on the corresponding day the mucous membranes of the under and upper lip, and of the dental pad, were completely covered with aphthous concretions, while the under surface of the tongue near its tip was coated with similar patches. In both animals the papillæ were much reddened and abraded at their tips. In the ewe a cutaneous eruption appeared about the fifth day; it was confined to the edges of the lips and to the skin on the inside of the thighs. In the former situation it consisted of papular elevations, similar in every respect to those seen around the mouth in bovine animals; in the latter the appearances were very indistinct and transitory.

The changes in the alvine evacuations also resembled those which occur in cattle. In the ewe the fæces were of normal appearance and form until the fifth day, when it was for the first time observed that they were coated with tenacious mucus, streaked with blood. On the next day there was diarrhœa, but it soon subsided. In the ram the fæces were from the first soft, and were passed in masses; on the third day diarrhœa came on, and the evacuations were observed to be streaked with reddened mucus; on the sixth day this symptom subsided, but recurred afterwards at intervals.

PART II.

PROPAGATION OF CATTLE PLAGUE.

Of the numerous and complicated questions relating to the propagation of Cattle Plague which were included in the plan of the present inquiry as originally laid down, I have been able to investigate experimentally, those only which refer to the nature and properties of the contagious principle of the disease as they are exhibited in the effects of inoculation, and to the length of the period of incubation.

1. *Effects of Inoculation.*

The question which stands first in its practical bearing on the employment of inoculation as a means of eradicating or preventing Cattle Plague is the following:—Is it possible by inoculation to produce a form of disease which, while it is protective against future attacks, is yet so mild that it admits of certain cure under ordinary circumstances, or in other words, that the affected animals, as a rule, recover with reasonable care as to hygienic conditions?

This question does not at present admit of an answer. It is true that although the results of the countless inoculations of Cattle Plague, which have been performed since the practice was first introduced in 1754,* show that there is no appreciable difference either as regards symptoms, progress, or duration, between the disease produced by inoculation and that which results from natural infection, provided that two fatal cases, or two cases of equal severity are compared with each other, yet the proportion of fatal and severe cases is much smaller in inoculated animals than in those naturally infected. So much so that in the majority of the former the malady is deprived of its malignant character, and tends to spontaneous recovery. But this fact loses its practical value by its inconstancy. While during certain epizootics, and in certain countries, the results of inoculation on the large scale have been so favourable as to lead even the opponents of inoculation to hope that they were mistaken, in others the mortality has been almost as great among inoculated animals as among those infected naturally. Until we are able, not only to say on what these variations depend, but to control them—until we have found out a method of producing a mitigated form of the disease at will, the problem will remain unsolved.

The practice of inoculation has had its strenuous and ardent advocates in every country of Europe—men who have not only made investigations themselves, but have pressed upon governments the expediency of testing its value by experiments on a large scale. All such proposals have been discouraged by the leading

* Of these an excellent account is given in Prof. Unterberger's "Beiträge zur Geschichte der Rinderpestimpfung." Dorpat, 1865.

members of the veterinary profession, for reasons which are of a similar nature to those which were urged against the practice of inoculation of smallpox at the end of the last century. In countries or districts in which the epizootic prevalence of Cattle Plague is so general that all animals are certain to be exposed to innumerable sources of infection, it is admitted that the practice of inoculation as a prophylactic is at least defensible, for its effect would be to reduce the duration of the epizootic to that of an individual case, and to settle once for all the loss to the community which would be occasioned by it. It is also very generally admitted that in countries in which the disease is constantly enzootic (supposing such countries to exist, of which there is no evidence,) inoculation is proper, no less on the ground of the probability that every animal will take the disease than for the sake of other countries.* But the introduction of inoculation as a *general prophylactic measure* is condemned by all the authorities. It would be unjustifiable, it is said, not only because the result is extremely uncertain, but also because inoculation cannot be carried out without the constantly recurring risk of originating outbreaks, the extent and destructiveness of which can neither be controlled nor foreseen.

So long as the main question remains unanswered—so long as we do not know how to produce at will a curable form of disease by inoculation, the conclusiveness of this argument does not admit of dispute. In the present state of our knowledge, it would not even be proper to recommend inoculation of sound animals in plague-stricken herds, as a means of bringing an outbreak of limited extent to a speedy conclusion. We are so unacquainted with the circumstances which determine the severity of its effects, that at present no man would be warranted in advising it, for the probable loss which would be sustained by the inoculation of any given number of animals could only be guessed at, not estimated.

During the course of the present inquiry 11 animals have been devoted to experiments, having reference exclusively to inoculation. Of these, of which nine were yearlings and two cows, six recovered and five died. In the first inoculations (Nos. 1, 2, 4, and 6), the method which is usually practised in Russia was followed. A curved needle of the same form and size as that used by Russian inoculators, perforated near its point, and armed with a seton soaked with virus, and composed of about half a dozen lengths of white worsted thread twisted together, was passed through a fold of the integument of the neck, previously pinched up between the thumb and finger. The needle having been withdrawn, the thread was allowed to remain in the wound for 48 hours, its ends having been previously tied together. In all these cases the wounds became swollen and inflamed, and in some, subcutaneous abscesses were formed which it was afterwards necessary to open with the knife. The discharge in which the threads were steeped was derived from the eyes and nostrils of a cow in the last stage of Cattle Plague. The period of incubation varied from 48 to 60 hours, and the total duration of the disease from eight to ten days. All of them recovered, the improvement commencing from the sixth day.

Another series of inoculations (Nos. 13, 17, 18, 19, 20) was performed by injecting the liquid virus under the skin of the perineum by means of a subcutaneous syringe, the quantity employed being in each case half a drachm. By this method no local effects whatever were produced. In No. 13 the liquid employed was serum of blood taken from the heifer No. 11, three days after the first rise of temperature observed in that animal. In this case as the period of incubation extended to six days, being nearly three times as long as in the previous experiments, it was judged expedient to repeat the inoculation with mucous discharge from the eyes of No. 12. Immediately after this had been done, the temperature began to rise, so that it may be presumed that the second insertion was futile. The progress of this case was remarkably rapid, death taking place early on the sixth day, a circumstance which I believe to be attributable to the fact that the animal was previously suffering from pulmonary disease arising from strongyli, as well as from flukes in the liver.

In the other four cases serum was also employed, but was taken from the cow No. 15, 17 hours after the first rise of the temperature. The purpose of these experiments was to ascertain in the first place, whether in Rinderpest the serum of blood is virulent, and secondly, to compare the effects of matter, taken at the earliest stage of the disease, while the mucous membranes still remain in a natural state, and the animal is to all appearance in perfect health, with those produced by the insertion of morbid secretions collected shortly before death. In all of these animals the incubation period was longer than in the former series, varying from four to seven days. No. 17, which recovered, resembled very closely Nos. 1, 2, 4, and 6, both as regards the progress and character of the symptoms. In Nos. 18, 19, and 20, which died, the disease assumed much the same character as in animals which had been naturally infected, the only remarkable difference being that in No. 20 death occurred about half a day later than usual.

In two other cases (Nos. 14 and 15) the operation was also performed by subcutaneous injection, but here the liquid employed was lachrymal fluid. In No. 14 it had been kept for seven days in capillary tubes, and had been taken between the fourth and fifth day of the disease, a fact which seems to have some relation to the period of incubation, which in this instance lasted for three days. In No. 15, the lachrymal fluid was collected between the seventh and eighth day from No. 14, the period of incubation was from 48 to 60 hours, and death took place 10 days after inoculation.

In addition to the animals above referred to, four of the calves sent by the French Government to the Albert College, (to be further mentioned in the section of this Report relating to vaccination,) were inoculated by Mr. Duguid by subcutaneous injection on the 15th of February. Of these, two were inoculated with lachrymal secretion collected from No. 19 on the fifth day of the disease; the other two with the same virus *diluted with ten times its volume of milk.* The symptoms recorded in these animals show that there was no difference either as regards the period of incubation, the duration of the symptoms, or the mode in which the fatal termination occurred.

It need scarcely be stated, that the experiments hitherto made have been so few that the conclusions drawn from them as to the effects of the methods of inoculation employed must be rather negative than positive.

In the first place, it seems to be tolerably clear that it would be incorrect to say that in any of the cases the disease was modified in the same sense in which smallpox is said to be modified in vaccinated persons, for even in the mildest cases, the development and progress of the disease are essentially the same as in those which terminate fatally; (2) nor can I for a moment believe that in the mild cases, Nos. 1, 2, 4, and 6, there was any relation between the character of the symptoms and the method of inoculation, not only because in Russia where this method is constantly employed, no such mitigation is observable, but because in a number of animals in which the same method of inoculation has been practised to my knowledge in England,

* With reference to the Steppes of Southern Russia special considerations are applicable. In the first place it has been shown on the clearest evidence that in the grey cattle of the Steppes the disease assumes a much milder form than in other breeds, and consequently that inoculated animals recover from its effects in much larger proportion than others; secondly, if it be admitted that the Steppes are the home of Rinderpest and the source from which all epizootics spring, it is clear that if all the Steppe cattle imported into Prussia and Austria were rendered insusceptible of the disease by inoculation, and thereby incapable of communicating it, it would eventually cease to exist in Europe. This is the idea which has been so perseveringly insisted on by that enthusiastic advocate of inoculation in Russia, Professor Jessen.

Dr. Sanderson. Report to Commissioners.

the resulting disease has assumed a most malignant character; (3) it appears to me no less evident that the results were in no way affected by the nature of the virus employed. For, on the one hand, the experiments on serum of blood certainly afforded no ground for believing that a mild form of disease could be produced by that method, while on the other, the results obtained from Mr. Duguid's inoculations with diluted virus, of the calves sent from France, do not encourage any further investigation in that direction.

2. *Period of Incubation.*

From the experiments already related it is seen that in animals inoculated with virus collected during the third stage of the disease, the first indications of infection exist about two days after inoculation; they also afford some ground for believing that in those cases in which these indications are deferred, the prolongation of the period of incubation was in relation to the period at which the matter inserted was taken.

In animals naturally infected the period of incubation is probably from four to five days. The following facts may be adduced in illustration: A heifer (No. 10) was bought on the 2nd of January for the purpose of experiments on vaccination. It was ascertained by inquiry from her former possessor, that the stable in which she had been kept for several months contained no other bovine animal, and that she had not been exposed in any way to Cattle Plague. On the 5th of January she was placed in a coach-house which had been for some time unoccupied at Notting Hill, along with two other yearlings (Nos. 11 and 12), three healthy cows occupying a contiguous three-stalled stable. On the 6th she was observed to be unwell, and on the 8th I found that the eruption of Cattle Plague on the lips had progressed to such an extent that it must have existed for two or three days. The two yearlings in the same coach-house were apparently well, but it was thought advisable to remove them to the experimental stable. As will be seen by a reference to the cases, they exhibited the initial signs of Rinderpest on the 11th and 12th respectively, and died on the 16th and 18th. The three cows that remained at Notting Hill, under the charge of Mr. Badcock, were vaccinated by him on the 13th; on the 15th they were reported to be ill, and were subsequently removed to the Albert College. From the appearance of the mucous membrane of the mouth there could, in my opinion, be no doubt that the eruption had appeared on the 14th, and consequently, that the disease must have commenced on the 12th—that is about the same time as in Nos. 11 and 12. Thus after three days exposure to natural infection, from the 5th to the 8th of January, the five animals became affected on the 11th or 12th, and were all dead by the 18th, showing that at least, in one instance, the period of incubation could not have exceeded five days. This result is confirmed by the more exact observations made in the heifer No. 15, in which the first rise of temperature took place just four days after it was placed along with diseased animals in an infected stable.*

PART III.

Account of Experiments undertaken with reference to the alleged Protective Power of Vaccination.

The steps which were taken at the beginning of the present year, for the purpose of determining the question, whether or not successful vaccination exercises any influence in modifying the progress or mitigating the severity of Cattle Plague, have been already sufficiently detailed in the introduction to this Report.

The first experiments relating to this special inquir were made during the last week in January, the result being of such a nature, as to make it appear tha Cattle Plague could be communicated with perfec facility to vaccinated animals, either by inoculation o natural infection, and that when so communicated i character was not modified. The question was thus a once conclusively settled; it therefore appeared un necessary to incur further expense with reference to i so that, although a large number of animals wer purchased for vaccination (amounting in all to 26), onl three were exclusively devoted to the object for whic they were originally intended, the rest (with th exception of those which unfortunately contracted th disease in the reserve stable at Notting Hill) bein employed for other experiments. Of these animals one (No. 14) was purchased of a gentleman, by whor it had been vaccinated in December 1865, at th suggestion of Dr. Harding of Grafton Street, for th purpose of testing the value of vaccination as a pre phylactic against Cattle Plague, while the other (Nos. 15 and 16) had been generously presented t the Commissioners for the same purpose, by Mr. Dum brell of Ditcheling, Sussex. In all three cases, th evidence of good vaccination was conclusive. Of th two fine cows presented by Mr. Dumbrell, one ha been vaccinated from the other. The success of both operations was guaranteed by Mr. Holman of Hurst pierpoint, and further indicated in the animal las vaccinated, by the regular form and satisfactor character of the crusts which were still adherent, and in the other by the appearance of the cicatrices. In both, the operation had been performed by fou insertions. With respect to the purchased animal although the visible results were not so satisfactory it was ascertained on the testimony of Dr. Harding that vaccine matter derived from it had been employed with perfect success, in the vaccination of several children.

The disease was communicated to two of these animals (Nos. 14 and 15) by inoculation, to the other by natural infection. The calf No. 14. was first inoculated on the night that it was brought to the college, with liquid discharge from the eyes of No. 12, which had been kept for six days in capillary tubes, there being at the time no diseased animal in the stables. As on the third day, the temperature of the body remained unchanged, the inoculation was repeated with virus taken directly from a heifer, at the fourth day of Cattle Plague. The result showed that the second inoculation was superfluous, for on the following morning, the temperature had risen to 105° Fahr., and continued above that height during the further progress of the disease. No other symptoms appeared until two days later, when the animal became constipated and lost appetite, and the mucous membrane of the mouth was for the first time affected in the usual way. Although the disease followed its regular course, it soon became obvious that the case was comparatively mild, for on the sixth day, when the unfavourable symptoms, which are the precursors of death, are as a rule to be looked for, no such change took place. There was no marked prostration, the dejections were still of greater consistence than natural, and liquid food was taken readily. On the seventh day diarrhœa came on, and the general state of the animal was worse, the evacuations being abundant and fœtid, and the discharge from the mouth and nares more profuse; but these symptoms soon receded, and convalescence set in.

The comparison of this case with those previously observed, in which the disease had been communicated to healthy animals by inoculation, afforded no ground for supposing that the progress of the symptoms had been favourably modified by vaccination; for with the exception of No. 13, all of those animals had recovered, and most of them without any severe symptoms, whereas here the animal was so ill on the seventh day, that it was thought to be dying. In No. 13 the progress of the malady was more rapid, but there the unfavourable result appeared mainly attributable to previously existing disease.

* Since the above was written the following fact has come under my notice. A bullock was placed, on the 26th of March, in the same stall with another animal, then at the third day of Cattle Plague. The temperature remained natural until the morning of the 31st, but at 3 p.m. on the same day it had risen to 104·0.

In the cow No. 15, which was inoculated from No. 13 by subcutaneous injection, the progress of the disease was also severe as compared with the other inoculated animals, but the case would probably have had a more favourable termination, had it not been that the animal was far advanced in the last month of pregnancy. Sixty-seven hours after the inoculation the temperature had risen to 103°·4. Two days afterwards the cow which had been previously healthy, appeared dull and refused food, and the mucous membranes of the lower lip and vagina exhibited the usual early appearances. There was nothing exceptional in the progress of the case; on the sixth day the cow began to feed sparingly, and the diarrhœa which had set in remarkably early, appeared to be less violent. Hopes of recovery were entertained, but on the following day the premonitory symptoms of parturition manifested themselves. As these progressed the prostration increased, until at 8 a.m. on the morning of the eighth day the membranes ruptured, and it became necessary to remove the calf. This was done without delay, but in spite of the free administration of alcoholic stimulants the animal sank during the night.

In this case it may be fairly presumed that death was attributable much more to the exhaustion incident to parturition than to the violence of the disease, for although the critical period had gone by, none of the symptoms which we have learnt to regard as harbingers of death had presented themselves.

The other cow which was also pregnant, but not at so advanced a stage, was placed in the same stable with No. 15 in the adjoining stall, which had been occupied ten days before by one of the cows brought from Notting Hill; it had been cleansed but not disinfected before No. 15 was placed in it. The progress of the disease in this case was remarkably rapid, symptoms of prostration occurring at an earlier period than in any other animal I had had under observation. The temperature rose five days after the animal was brought to the stable. In other respects it remained perfectly well until two days later, when the appetite failed and constipation was for the first time observed; the mucous membranes of the vagina and mouth presented the usual morbid changes, having been on the previous day perfectly natural. On the fourth day of the disease nothing unusual was noticed, but on the fifth the muscular weakness was extreme. The animal lay powerless in its stall with outstretched limbs, and could not be induced to move or even to make the slightest effort to rise. The temperature had sunk from 106° to 102°, the pulse was frequent and excessively weak, and diarrhœa had set in with violence. On the following day, the sixth of the progress of the disease, the diarrhœa and the prostration continued, but had not materially augmented, the pulse however could not be distinguished. In the evening the animal expired.

I had subsequently the opportunity of observing the phenomena of Cattle Plague in eight vaccinated animals which were sent to the Albert Veterinary College by the French Imperial Government for the investigation of the alleged protective power of vaccination. These animals were of ages varying from three months to a year; they were all healthy, and all of them exhibited characteristic vaccine crusts which were still adherent. The operation had been performed by at least twelve punctures in the hollow in front of the left thigh, the hair having been removed for the purpose over a surface as large as the palm of the hand. The results of these experiments are given collectively in the following table, for the materials of which I am indebted to Professor Gamgee.

Tabular Summary of Observations of Respiration, Pulse, and Temperature, taken at 4 p.m. daily, during the Progress of Cattle Plague in eight Calves, sent by the French Government to the Albert Veterinary College previously successfully vaccinated.

First Series, Nos. 1—4, infected naturally.

Description of Animal.	—	Average during health.	Number of observations from which the average is calculated	1st Day.	2d Day.	3d Day.	4th Day.	5th Day.	6th Day.	7th Day.
No. 1.—Cow calf, three months old, kept for 14 days in a stable adjoining that occupied by the experimental animals of the Royal Commission.	Pulse	69·2	14	60	60	64	68	72	68	Imperceptible.
	Respn.	20·9	15	12	22	24	30	32	36	25
	Temp.	102·3	15	105·0	106·2	107·2	108·2	107·6	107·0	103·0. Died at 6 p.m.
No. 2.—Cow calf of the same age, kept in the same stable for the same time.	Pulse	65·0	11	58	60	55	68	54	60	72
	Respn.	21·37	13	15	18	24	21	22	24	20
	Temp.	102·27	13	103·4	103·8	104·0	105·4	106·2	106·4	106·0. Died during night
No. 3.—Cow calf, of the same age, kept in the same stable for seven days.	Pulse	78·0	3	88	72	80	81	87	Imperceptible.	—
	Respn.	20·0	3	18	21	20	18	20	20	—
	Temp.	102·46	3	105·2	106·2	107·2	107·8	104·6	100·2. Died in the evening about 9.	
No. 4.—Cow calf, of the same age, kept in the same stable for seven days.	Pulse	68·33	6	72	60	72	104	Imperceptible.	—	—
	Respn.	23·71	7	24	35	62	54	32	—	—
	Temp.	102·65	7	105·0	106·6	105·2	104·6	99·2. Died during the night.		—

Second Series, Nos. 5—8, infected by inoculation.

No. 5.—Cow calf, three months old, inoculated on the 15th of February with discharge from the eyes and nose of No. 19, diluted with 10 times its volume of milk.	Pulse -	81·5	6	86	87	81	85	80	86	—
	Respn.	21·14	7	21	30	36	42	38	41	—
	Temp.	102·71	7	104·8	105·0	107·0	106·8	106·4	105·2.	Diarrhœa, followed by death during night.
No. 6.—Cow calf, of the same age, inoculated on the same day with the same virus not diluted.	Pulse -	66·0	5	84	76	66	66	74	84	Imperceptible.
	Respn.	19·42	7	20	26	21	23	30	16	36
	Temp.	102·91	7	104·0	105·8	106·8	105·8	106·2	106·4	102·6. Died during night.
No. 7.—Cow calf, one year old, inoculated on the 15th of February with the same virus diluted in the same way as No. 5.	Pulse -	74·5	2	72	84	96	87	97	96	108
	Respn.	16·3	3	21	24	48	39	42	38	48
	Temp.	102·3	3	103·8	105·4	107·0	107·2	106·8	106·6	106·0. Died the same evening.
No. 8.—Cow calf, one year old, inoculated in the same way with the same virus not diluted.	Pulse -	63·0	2	72	80	90	73	81	76	96
	Respn.	18·5	2	18	30	30	33	32	42	38
	Temp.	102·1	2	104·8	106·8	107·4	106·8	106·2	106·0	106·0. Died in the night.

N.B.—Mr. Worms' mode of treatment was employed in several of these cases.

Dr. Sanderson. Report to Commissioners.

Extracts from some of the most important recent Publications, relating to the practice of inoculation in Russia, selected with special reference to the question of mitigation.

1. *Contributions to the History of Cattle Plague Inoculation, by Friedrich Unterberger, Professor and Director of the Veterinary School at Dorpat.* Dorpat, 1865, pp. 41.

"Inoculation was first recommended as a prophylactic against Cattle Plague in the Steppes, by Walz in 1803, subsequently by Viborg in 1809, and still later by Jessen in 1834, and by Spinola in 1846. . . . . Spinola stated the grounds of his recommendation as follows:—'The main advantage of inoculation consists in its shortening the duration of an epizootic. It can be advantageously resorted to only when whole countries are so overrun with the disease that it can no longer be mastered by killing the plague-stricken animals. It is, moreover, particularly advisable in countries in which circumstances render it impossible to exercise a complete control over the movement of cattle.'"

In the year 1852 a commission was appointed by the Russian government, "to inquire into the best means of extinguishing the Cattle Plague." After receiving and considering a number of reports from the veterinarians of Russia and other countries, this commission arrived at the conclusion "that the employment of measures of quarantine to prevent the diffusion of Cattle Plague by contagion could not be entertained so long as the home of the disease could not be defined with certainty," and recommended, after adverting to the favourable results that had been obtained in other countries by inoculation, both in former times and more recently, that experiments should be made with reference to it. In adopting this course, they were much influenced by the treatise of Professor Jessen "On the complete eradication of Cattle Plague."*

"The experiments were commenced in 1853, first in the government of Charkow (Orenburg) and Koursk, and subsequently in Cherson and Viatka. . . . . The most striking results were obtained in Charkow and Koursk, where 60 died and 999 recovered out of 1,059 animals that were inoculated." Further experiments were undertaken in Cherson in 1854, under the supervision of Professor Unterberger himself, who determined "to employ exclusively virus taken from animals in which the disease had assumed an exanthematous character" . . . by which means he thought that the end he had in view of obtaining a mitigated virus would be promoted. He anticipated immense advantage from the employment of such a virus for the inoculation of herds already infected with Cattle Plague, as an auxiliary to other preventive measures.

"The results of the experiments made in the south of Russia near Odessa," says Unterberger, "exceeded my expectations. In experiments performed by my colleague Jessen during the previous year seven animals died; in my own no deaths occurred. Of 64 animals only one took ill with the symptoms of Cattle Plague, and that one recovered; a second died, but not of this disease. Mitigation of the virus was out of the question, as there was nothing to be mitigated.† I used virus collected either 24 hours, or 10 months, and 24 days previously; all in vain. Two series of inoculations were performed, each series including three transmissions, and always with the same result." ‡

"I sent twenty of the animals inoculated in 1853, and eleven others recently inoculated by myself, to Helenenthal, a German colony in the neighbourhood, where Cattle Plague had raged in a malignant form; every possible test was applied, but all remained healthy. I gave to the animals which had been inoculated, fodder taken from stalls of animals affected with the disease in the districts of Cherson and Bessarabia; still they remained healthy. All the inoculated animals were for a long time exposed to contact with the skin of a diseased ox, which was dissected by myself, the saliva of which had produced by inoculation the only case of true Rinderpest which occurred amongst the animals I inoculated. The result remained the same."

". . . . I could account for these facts only by supposing (1) that the experimental animals of the Steppe breed were subject to the ordinary conditions (dass ich die Thiere von der Steppenrace den gewohnten Verhältnissen nicht entrissen hatte), and

* In the earlier part of the paper, Professor Unterberger gives a complete historical summary of all the experiments on inoculation performed in different countries from 1744 to the present time.

† That is, the disease assumed from the first so mild a character that it seemed capable of no further mitigation. J. B. S.

‡ The details of these experiments will be found in Extract No. 3. I am informed that many of these subsequently contracted the disease by natural infection, and that some died. J. B. S.

that the virus had by preference been taken from nals in which the disease had assumed an exanthe- ous character.

I thought my results too favourable to be received hout misgiving . . . . I therefore judged it best ubmit uninoculated cattle, which, according to the cement of their owners, had never had Rinderpest, the same tests as the others. Thirty-two such nals, of which twenty-two were sucking calves d therefore beyond the suspicion of having had the ase), were thus tested. The full-grown animals e not affected, the calves became emaciated at , but none of them took Cattle Plague."

hese experiments left Unterberger in greater bt as to the value of inoculation than before, and him to conclude that the question could only be led by sending the inoculated animals into other s of Russia, where the disease assumed a more gnant and fatal form than in Cherson ; and he efore recommended that a number of them ld be driven into the province of Kasan. "My ce," he says, "was not followed, but it was rmined to test and repeat the observations made 1853 and 1854, with special reference to the tion of mitigation, and wherever possible to ulate infected herds. These experiments were mitted to my colleague, Professor Jessen, and elf . . . . The result was the same as before. effect produced by inoculation was even more gnificant, so that again there could be no question itigation."

In spite of all tests, the inoculated animals of 3 and 1854 remained healthy, but subsequently le Plague broke out among those inoculated in 5 (being imported from Bessarabia), although they been twice operated on. I attributed this to the umstance that in this year less care was taken elect virus from animals in which the disease ibited an eruptive character, and I was confirmed his notion by the favourable result of the final test eriments which I made in 1857 in the governments Charkow, Mohilew, and Smolensk.* It is true of my 64 experimental animals only 10 were osed to these tests, but these, as well as 20 others, ulated in 1853 and 1855, passed though them ndidly—not one of them was infected. Since 5 I have not taken part directly in experiments inoculation, but I have felt great interest in them, ticularly in those lately made on the farm of the nd Duchess Helena Pawlowna at Karlowka."† re, as well as at Bondarewka in Cherson, the ults were very favourable. "Virus which had n kept not less than a year and a half acted and protective. It was thought that it had been igated by time. Of many hundred animals in- lated with it only one per cent. died, and the mals resisted the most varied tests." At the In- lation Establishment at Salmysch in Orenburg y appear to have been less successful.‡

Unfortunately the hopes entertained of a favourable ution of the question were destined to be dis- ointed, for in 1862 a series of experiments was made Dorpat under the most favourable circumstances, ich, as Unterberger remarks, "were available only the purposes of pathological anatomy."§ Further periments were subsequently made in the South of ssia with reference to which he observes, "Every asion, as to the value of inoculation as a prophy- tic was dispelled from the scientific mind when ofessor Roschnow published his report on the servations made in the inoculation establishments the provinces of Cherson and Orenburg in 1864.‖

When the results obtained at Bondarewka in 1864, and at Salmysch since 1860, are compared with those previously recorded in various parts of Russia since 1853, it appears, in spite of the splendid successes which have been occasionally met with in Russia as well as in other countries,—(1.) That inoculated cattle in which the operation does not give rise to the symptoms of plague must not be regarded as protected ; (2.) That the loss which is occasioned by successful inoculation is relatively great ; and (3.) That the mitigation of Cattle Plague virus . . . on which we had reason to build such great expectations has not proved to be of value.

"In my opinion, therefore, protective inoculation ought not to be employed, even in the Steppes, without the special permission of private stock owners, mainly for the reason that the inoculated disease is quite as contagious as that which is produced by natural infection. But in countries in which it is impossible to organize a veterinary police, the circumstances are special : for in the same proportion in which the contagion of Rinderpest is increased by inoculation, the danger of its being further diffused is augmented. On the other hand, the experiments we have made show that in Russia inoculation may be advantageously employed in infected places where it is impossible to have recourse to other measures of prevention ; its application need not be attended with difficulty, provided that the owners of stock are compensated to the full value for every animal dying in consequence of inoculation."

2. *On the question of the value of inoculation of Cattle Plague, with reference to the Russian Steppes, by Professor Jessen of Dorpat.* Oest. Vierteljahrschrift für Veterinärkunde, 1865.

In this paper the author replies to the arguments of Professor Unterberger, maintaining that the value of protective inoculation is proved, not only by the recent experiments at Karlowka, but by those in the two Inoculation Establishments in the provinces of Orenburg and Cherson. Referring to the fact that between November 1857 and December 1861, 719 cattle were inoculated, of which 696 were thereby infected, and only 39, or five and half per cent., died, he asks the question, "Would not every stock owner in the Steppes gladly sacrifice so small a proportion of his young cattle if he could protect his herds from Rinderpest ?"

Professor Jessen disagrees with all the conclusions arrived at by Unterberger. He believes that animals which have been inoculated, even if they have not exhibited thereafter marked signs of Cattle Plague, may yet be thereby protected. As regards the question of mitigation, he thinks there are as many facts in favour of it as against it, but declines to enter upon the subject, as it would take up too much space.

In conclusion, he states, that in the Steppes public opinion is so favourable to protective inoculation, that the practice will not be relinquished, in spite of the adverse judgment passed upon it by the Imperial Commission ; and adds, that two veterinary surgeons, formerly pupils of the Dorpat School, have discovered a method of inoculating in the Steppes with an extremely small mortality.

3. *Report on the inoculations in Baraboi in* 1854, *by Professor Unterberger.* (*This report forms the second of a collection of papers published in* 1859 *by the Imperial Commission on Cattle Plague, under the following title :* "*Gesammtbericht über die seit,* 1853, "*in Russland fortgesetzten Versuche, mit der Imp-* "*fung der Rinderpest,*" *and transmitted to the Foreign Office by H. M. Minister at St. Petersburg.*

The experiments were conducted at the farm of Baraboi, 40 versts from Odessa. The virus employed was obtained by preference from animals in which there was a cutaneous eruption. The operation was performed by passing a seton of woollen thread through

* See Extract No. 4.
† See Extract No. 5.
‡ I have not been able to find the details of these experiments. J. B. S.
§ See Extract No. 6.
‖ See Extract No. 7. It is difficult to see how Professor Roschnow's results bear on the question. J. B. S.

Dr. Sanderson. Report to Commissioners.

a fold of skin, as described in my report. The setons were allowed to remain several days.

In all 64 animals were inoculated, in two series. Of the first series, comprising 30 animals, 10 (of the Steppe breed) were inoculated with virus collected in the immediate neighbourhood. The results were of the mildest description; the animals lost appetite, ceased to ruminate, had slight diarrhœa, and exhibited some increase of the pituitary and lachrymal secretions, but they were all well by the thirteenth day after the operation. From these, virus was collected on the fifth day of the disease, for the inoculation of 10 more animals, of which 8 were of the Steppe breed. In these cases also the symptoms were very trifling, except in one animal, in which lachrymation, grinding of the teeth, and general depression were observed. From this animal 10 calves of the Steppe breed were inoculated without result.

For the inoculation of the 34 animals of the second series, virus was obtained partly from Bessarabia and partly from Orenburg. Twelve calves, of which 10 were of the Steppe breed, were first inoculated, 8 of which exhibited symptoms very much resembling those observed in the animals of the first series. In one case the phenomena were more marked, and it was therefore employed for the inoculation of 14 animals, of which 12 were of the Steppe breed. All of these inoculations were successful excepting one. In one animal there was diarrhœa, and the mucous membrane exhibited the characteristic eruption. It yielded virus for the inoculation of eight animals, all but one of the Steppe breed. The effects were of the most trifling description.

Thus, although the greater number of animals inoculated exhibited certain symptoms in consequence of inoculation, those which are characteristic of well-developed Cattle Plague were observed in one only. All the animals were subsequently exposed to various tests for the purpose of ascertaining their susceptibility, but none of them were infected. As, however, 32 uninoculated animals passed through the same tests with similar immunity, no conclusion could be derived from the results.*

4. *Report on the experiments made in the province of Smolensk on the communication of Cattle Plague to animals previously inoculated in New Russia, by Veterinärarzt Hofrath Rasdolsky.* (*This Report forms No.* 12 *of the collection above referred to.*)

In September 1857 Cattle Plague prevailed at Trutnewo in the province of Smolensk. Twelve inoculated animals from Gidirim and Baraboi, and two calves from the same locality, not inoculated, were sent to Trutnewo, and placed in a stable in which many animals had died of the disease, and in which the bodies of the dead animals and the discharges of the living were exposed. After remaining two nights they were removed, and on the 3d of October the twelve bullocks were re-inoculated, and one of the calves inoculated in the usual way, and at the same time the virulent discharges were rubbed into their nostrils. On the 10th they were driven to Troizki, a place where Cattle Plague was then raging, and were placed in a stable with diseased animals. No effect following in eight days, they were fed out of the hides of oxen that had died of the disease, and had their noses and mouths rubbed with infected blood. After remaining two weeks, all, excepting the calf which had not been inoculated, remained healthy. The calf took ill on the 21st and died on the 24th.

7. *Extract by Professor Unterberger from the Report of Professor Roschnow on experiments made in the Inoculation Institution in Cherson, published in Russian in the Journal of the Ministry of Crown Lands, vol.* 84, 1863.†

It had been asserted by the directors of the Inoculation Establishment, that Cattle Plague virus became mitigated by being kept, without losing its virtue; that, in animals inoculated with such virus, althou the symptoms which resulted were of the most trifli description, consisting mainly of lachrymation, anorexi and cough, the inoculated animals were protected fro future attacks. For the purpose of ascertaining how far this assertion was well founded, twen animals which had been inoculated at Bondarewk with lymph which had been kept for six or seve months were subjected to experiment, six being r inoculated with fresh lymph, the remainder exposed t natural infection. The results showed that th animals were not protected from the disease; ten them became ill, and five died.

With reference to the question of the activity of kep virus, Professor Roschnow inoculated animals wit various specimens of virus preserved in capillary tube for periods varying from one month to eleven month Fourteen animals were inoculated, without result i any case.

Professor Unterberger appends to this notice statement that other experiments were made in th same year by Professor Rawitsch in conjunction wit Professor Jessen. Rawitsch arrived at the following results, with which, however, his coadjutor did no concur:

1. Inoculation with old virus was ineffectual.
2. Animals inoculated with old virus subsequently contracted the disease when re-inoculated o exposed to natural infection.
3. Inoculation with fresh virus was attended in the institution with very considerable mortality; but in a neighbouring village, where an epizootic of Cattle Plague had already prevailed for some time, 80 animals were inoculated, of which only 16 died.
4. Cattle which recovered from the disease after inoculation could not be again infected by any exposure.

8. *Report on the inoculation of Cattle Plague on the estate of the Grand Duchess Helena Pawlowna at Karlowka, from May to September* 1864, *by Max Raupach, Veterinary Surgeon at Karlowka.* Dorpat, 1865.

This report contains the most favourable results of inoculation which have yet been obtained in Russia. The experiments were performed in two series. The animals of the first series were inoculated in three batches, viz., on the 12th, 21st, and 29th of June.

June 12.—Six yearling calves of Steppe breed were inoculated with virus taken 34 hours previously from an animal affected with natural Cattle Plague. All became ill (two on the sixth day and four on the seventh), and one died.

June 21.—Thirty-six yearling calves were inoculated from three of the first batch. Distinct and severe symptoms appeared in all, in 21 on the 7th day, 13 on the 8th day, and two on the 9th. Four (or $11\frac{1}{9}$ per cent.) died.

June 29.—A hundred and thirty-six animals, comprising 120 oxen from two and half to three and a half years old, and 16 steers, were inoculated from two of the second batch. 35 took ill on the 6th day, 44 on the seventh, 36 on the eighth, and 21 on the 9th. Five died—$3\frac{2}{3}$ per cent.

The inoculations of the second series were performed in five batches.

July 27.—Ten two year old heifers were inoculated with the same virus which had been employed on the 12th of June. It had been kept in ice. All had marked symptoms, which presented themselves in two cases on the sixth day, and eight on the seventh. One died.

August 9.—Twelve two year old heifers were inoculated from one of the previous batch. Four took ill on the sixth day, six on the seventh, and two on the eighth; but none died.

August 18.—Ninety-seven heifers, twenty-six two year old oxen, and 4 calves, in all 127, were inoculated from those of the 9th of August. 34 were attacked

* See Extract No. 1.

† The extract of which this is a short summary is to be found at the end of Professor Unterberger's pamphlet on the history of Cattle Plague.

on the sixth day, 53 on the seventh, and 40 on the eighth. Eight (6½ per cent.) died.

August 26.—Ten animals, including two oxen, six steers, and two ox calves, were inoculated from the last batch. One was affected on the sixth day, two took ill on the seventh, and seven on the eighth. None suffered severely, and all recovered. N.B.—All the animals above mentioned were of the Steppe breed.

On the same day four oxen of pure Devonshire breed were inoculated with the same virus. Well marked symptoms presented themselves, followed by death between the sixth and ninth day after inoculation.

September 17.—Twelve two year old Steppe oxen were inoculated with virus which had been taken fifteen days before from one of the six steers of the last batch. Eleven took ill on the seventh, and one on the eighth day, and one died.

Thus it appears that out of 349 animals inoculated in four months 20 died, or 5¼ per cent. In all 1189 animals have been operated upon at the Inoculation Institution at Karlowka since it was first established in 1857. The author tells us that its operations, which have been very successful, have been conducted on the following plan :—

When an animal is brought for inoculation, the owner is required to state the value, and to pay one-fifth to defray the expenses of its keep during the eight weeks that it remains in the establishment. At the end of this time, if it recovers, it is restored to the owner in good condition ; if it dies from any cause in the institution, or from Cattle Plague at any subsequent period, he is entitled to the full value originally set upon it. Every animal is marked with a peculiar brand on leaving the establishment. Raupach says, that during the 8 years not a single branded animal had died of Cattle Plague, although many of them had been kept for several weeks with herds decimated by the disease, of which three outbreaks had occurred since 1857.

Notwithstanding these favourable results, the author admits that the institution is not well supported, and confesses that what has been done amounts to very little (eben so viel wie nichts). Still, however, he regards inoculations as the only important means of suppressing Cattle Plague, and is of opinion that "veterinary police regulations never have been of any advantage and never will, for in Austria the epizootic has not been kept out or prevented from spreading, and remaining for many years, in spite of the most stringent measures of quarantime and of isolation, and the application of the pole-axe. . . . . Why then," says he, "should we hesitate any longer ; why should we occupy any more time in experiments which can only yield similar results ? Meanwhile thousands are suffering, and looking in vain for aid, which nevertheless could be afforded in relatively short time by the general adoption of inoculation."

Conclusions of the Russian Commission as to the inoculation of Cattle Plague, extracted from their Report, published in 1865, *and transmitted to the Foreign Office by H. M. Minister at St. Petersburg.**

After stating their opinion that Cattle Plague is analogous to typhoid or gastric fever (differing from it in the existence of general catarrhal inflammation of the mucous membranes, and particularly of the alimentary canal) ; that the place from which it originates cannot be ascertained; that the disease, although communicable through the air, can only be so communicated to a very short distance ; that it is neither so infectious nor so malignant in the southern provinces as elsewhere ; that it is milder in summer and winter than in spring and autumn ; and that the cattle of the Steppes of Southern Russia, and of the Kirghis and Calmuck breeds, are not only less liable to the disease, but pass through it more easily than others,—the Commissioners proceed to discuss the results of the experiments on inoculation as follows :—

Dr. Sanderson's Report to Commissioner

"There are facts, which have appeared to some to afford proof, that the virus of Cattle Plague is capable of mitigation by transmission ; as, however, in the latest experiments,† it was found that no mitigation, [of the symptoms produced by inoculation] was observed, even when virus of the 15th transmission [that is, virus which had been transmitted through 15 series of animals] was employed, we are inclined to affirm that mitigation cannot be obtained by this method.

"With reference to the question, how long the virus of Cattle Plague is capable of retaining its activity, the experiments do not lead to a definite conclusion. In some cases, it was found to have lost its power after a few days, in others, effects were produced even after 11 months. Experiments have shown that the symptoms resulting from fresh and old virus are different. Whereas when old matter is employed, the reaction is very slight, and in many cases no effect is observed, the inoculation of recent virus usually produces a violent attack.‡

"Animals in which inoculation has produced a severe attack of the disease are rendered thereby insusceptible of future attacks, but those that have been slightly affected are found not to be always secure from second infection. Our experiments do not enable us to limit the duration of the protection afforded by inoculation, as they were confined to a period of six years. It may possibly be indefinite."§

From a paper appended by the Commissioners to their conclusions, and approved by the Minister of the Interior, it appears that the Russian Government have not entirely abandoned the employment of inoculation :—

"Although the experiments hitherto made are insufficient to justify the Government in recommending inoculation as an infallible means of preventing the development of natural Cattle Plague, the Commission think that there is no objection to permitting private individuals to establish institutions for inoculation with the consent of the owners of stock in the neighbourhood, and in situations which are at a distance from drove-roads, provided that the inoculations are under the direction of skilled veterinarians," whose duty it would be to report their proceedings periodically.

J. B. Sanderson.

* The report is in Russian. It is entitled, "Report on the "Inoculation of Cattle Plague. Experiments performed under "the direction of the Imperial Commission for the advancement "of Veterinary Art and the investigation of measures for pre-"venting Epizooties in the Empire," 1865. The extracts have been translated by the Rev. E. Popoff, Chaplain to the Russian Embassy.

† These experiments were made at the Inoculation Establishment at Salmysch in Orenburg. I am unable to find any detailed account of them. Professor Pelikan, one of the Commissioners, in a paper appended to the report, says, that 15 animals were employed, and that the observations were made with the utmost care, so that "they are worth more than a thousand indiscriminate experiments, made without due regard to accidental circumstances." He thinks that the cases of mitigation alleged by the advocates of inoculation were referable to the mildness of the prevailing epizootic, or to the fact that the animals had been rendered insusceptible by previous attacks. He considers the question definitively settled. Professor Jessen, also a member of the Commission, protests against this conclusion.

‡ Professor Pelikan admits that the negative results obtained in his experiments with kept virus may have been due to defective methods of storage.

§ On this point Professor Pelikan remarks :—"The fact that an animal, not previously affected with Cattle Plague, stands the test of exposure to natural or artificial infection, affords no proof that it is secured indefinitely, for, although it may escape to-day from want of susceptibility, or may be but slightly affected, it is not the less liable to contract the disease to-morrow, with all its characteristic symptoms."

Dr. Sanderson.

Report to Commissioners.

RECORD OF OBSERVATIONS.

I.—Daily Observations before Inoculation.

Case No. 1.—A white heifer with red patches on the head and body; weighing 472 lbs.; age about 9 months. Under observation before inoculation from November 8th to November 30th; after inoculation from December 1st to December 21st.

Date.	Hour.	Pulse.*	Respiration.*	Temperature (Fahr.) in Rectum.	Remarks.
Nov. 8	8 30 P.M.	62	30 to 37	Not recorded.	
„ 9	8 30 A.M.	62	23		
„ „	7 30 P.M.	64	33		
„ 10	8 30 A.M.	57	27	101·8	
„ „	8 0 P.M.	72	38; ruminating	102·6	
„ 11	8 30 A.M.	71; standing	41 „	102·8	
„ „	9 0 P.M.	72	54 „	102·4	
„ 12	9 0 A.M.	78	52; standing	102·6	Animal very irritable; has been restless during the night.
„ „	9 0 P.M.	78; standing	52 „	103·2	
„ 13	8 0 A.M.	68; standing	34, very irregular; ruminating.	103·2	Distinct signs of rutting this morning.
„ „	8 0 P.M.	70	45; ruminating	105·8	
„ 14	8 30 A.M.	71	52 „	106·4	
„ „	8 30 P.M.	72	70; standing restless; belly very full.	104·7	
„ 15	8 30 A.M.	70	38; not ruminating	103·3	
„ „	9 0 P.M.	61	42; ruminating	103·4	Less irritable; signs of heat have disappeared.
„ 16	9 0 A.M.	61	38 „	102·4	
„ „	9 0 P.M.	72; standing	34 „	103·7	
„ 17	9 0 A.M.	66	— „	101·9	
„ „	9 0 P.M.	70	76, irregular; standing. 68; lying	102·8	
„ 18	9 0 A.M.	64	44; ruminating	102·9	
„ „	9 0 P.M.	72	58; not ruminating	103·0	
„ 19	9 0 A.M.	72	44; ruminating	102·9	
„ „	9 0 P.M.	73	75; not ruminating	103·2	
„ 20	9 0 A.M.	70	52 „	Not recorded.	
„ „	8 0 P.M.	70; standing	62; standing		
„ 21	8 0 A.M.	66 „	72; standing	102·8	
„ „	9 0 P.M.	71 „	50; standing; irregular.	102·8	
„ 22	8 0 A.M.	64	60 to 65; not ruminating.	102·3	
„ „	9 0 P.M.	73	64	103·3	
„ 23	8 0 A.M.	No observation made.	54; ruminating	No observation made.	
„ „	9 0 P.M.	72; standing	58 „	102·4	
„ 24	8 0 A.M.	62	40; not ruminating	101·6	
„ „	8 0 P.M.	68	74; ruminating	102·0	
„ 25	8 0 A.M.	68; standing	64; standing	102·4	
„ „	8 0 P.M.	66	64; ruminating	101·8	
„ 26	9 0 A.M.	65	58 „	101·7	
„ „	8 0 P.M.	60	64 „	101·3	
„ 27	— A.M.	No observations made.			
„ „	8 0 P.M.	66; standing	64; standing	102·4	
„ 28	9 0 A.M.	68	58; ruminating	101·8	
„ „	8 0 P.M.	72	60 „	No observation made.	
Dec. 1	— A.M.	No observations made.			
„ „	8 0 P.M.	68	40; ruminating	102·0	*Inoculation performed this evening.*
„ 2	8 0 A.M.	68	48 „	102·3	Animal weighed; weight 460 lbs. Decrease since Nov. 8th = 12 lbs.
„ „	8 0 P.M.	84	65 „	103·3	
„ 3	8 0 A.M.	75	56; posture not noted.	103·6	
„ „	8 0 P.M.	78	48 „	102·7	
„ 4	9 0 A.M.	30	33; ruminating	103·8	
„ „	8 0 P.M.	82	60 „	103·7	
„ 5	8 0 A.M.	74; standing	52; standing	106·1	The visible mucous membranes were examined at 2 P.M. Vagina generally pink, but reddened near clitoris. Mucous membrane of mouth of natural appearance, *i.e.*, of a uniform pale pink colour.
„ „	8 0 P.M.	76	56; not ruminating	106·8	
„ 6	8 0 A.M.	68	50 „	Not recorded.	
„ „	8 0 P.M.	69	57 „	107·1	The animal appears dull, eats but little, and lies constantly. On the upper gum several small opaque white elevations are observed, and a small patch of redness below the right corner tooth.
„ 7	8 0 A.M.	72	68 „	106·4	Animal very dull, and not feeding. No discharge from mucous membranes.

*The observations of pulse and respiration were always taken in the recumbent posture, excepting when the contrary is stated.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Dec. 7	8 0 P.M.	86 - -	58; not ruminating	106°·2	Mucous membrane of vagina unaltered. Elevated specks on upper gum, which have extended since last night into patches. Two similar elevations are observed on the lower lip. At the base of one of the papillæ of the cheek nearly opposite the corner tooth on the right side there is a small red spot where the epithelium is detached. Not feeding.
„ 8	8 0 A.M.	84, weak and thready.	54; standing -	104·6	Fæces of firmer consistence. Extremities cold.
„ „	8 0 P.M.	86, weak -	41 „	106·0	Has only eaten a few handfuls of hay to day; very dull; coat staring slightly; legs and ears cold. In introducing the thermometer the bulb is grasped by the sphincter. Mucous discharge from nares, but no change in the appearance of the mucous membranes. Vagina redder, and covered at the upper part with a creamy discharge. Patches on gums extending.
„ 9	8 0 A.M.	85, weak; standing	41 „	106·1	
„ „	8 0 P.M.	80, weak -	44, interrupted *	105·3	The animal feeds but little, and is very dull; coat staring; extremities cold; mouth hot; appearance of vagina unaltered. The upper lip exhibits a chain of bright red patches of irregular form, the largest of which are near the middle line, and measure about a third of an inch every way. Towards the left side there are numerous groups of smaller oblong or oval patches, the long diameters of which are parallel to the edge of the gum. Each of these patches is bordered with a white opaque elevated margin.
„ 10	— A.M.	74, weak -	Irregular, about 48	104·6	Animal neither feeds nor ruminates. Constipation continues.
„ „	8 0 P.M.	74, weak -	18; not ruminating	105·8	Fæces passed in hard rounded masses. Thermometer grasped by sphincter; coat staring; extremities cold; increased sensibility of back; prolonged pause between inspiration and expiration, followed by an audible catch. Abrasions on the upper gum are now healing; the abraded surfaces are replaced by slightly red patches having indistinct smooth edges without indentation. On the hard palate there are some pink spots slightly depressed below the surrounding surface.
„ 11	8 0 A.M.	72, weak -	32 - -	105·3	Thermometer grasped by sphincter. Fæces solid; character of respiration unaltered.
„ „	8 0 P.M.	66 - -	23 - -	106·0	Animal feeds this afternoon; fæces solid; mucous membranes almost healthy; patches on upper lip scarcely perceptible; no eruption on skin.
„ 12	8 0 A.M.	74 - -	28 - -	105·9	Has eaten 2 lbs. of turnips, and a little hay.
„ „	8 0 P.M.	72 - -	20; standing -	105·9	Mucous membranes now quite healthy.
„ 13	8 0 A.M.	72 - -	26 - -	106·0	
„ „	8 0 P.M.	72 - -	20 - -	106·0	Animal feeds better, and ruminates; fæces hard.
„ 14	8 0 A.M.	70 - -	Not counted -	105·3	
„ „	8 0 P.M.	74 - -	18 - -	105·0	Inspiration accompanied with a loud hoarse snore. There is a swelling in the intermaxillary space, opposite the thyroid cartilage. The animal appears to swallow with difficulty
„ 15	8 0 A.M.	72 - -	18 - -	106·3	
„ „	8 0 P.M.	72 - -	16 - -	105·4	Difficulty in swallowing and snoring continue.
„ 16	8 0 A.M.	68 - -	18 - -	105·4	
„ „	8 0 P.M.	68 - -	20 - -	105·6	Animal eats but little; urine acid.
„ 17	8 0 A.M.	72 - -	20 - -	105·9	Fæces dry and hard.
„ „	8 0 P.M.	72 - -	16; standing and ruminating.	105·0	
„ 18	8 0 A.M.	70 - -	18; standing -	105·2	
„ „	8 0 P.M.	66 - -	18 „	104·1	The snoring noise in inspiration has almost ceased. The animal seems lively, and feeds as well as before inoculation. During the following three days the temperature sank to its former level.

* The word "interrupted" is used in this and in the following cases to denote the mode of breathing described in page 12 (first paragraph) as characteristic of Cattle Plague.

CASE No. 2.—A white bullock with red ears; weighing 391 lbs. Under observation before inoculation from November 8th to November 30th; after inoculation from December 1st to December 20th.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Nov. 8	3 30 P.M.	58 - -	27 - -	Not recorded	
„ 9	8 30 A.M.	55 - -	22 - -		
„ „	7 30 P.M.	62 - -	30 - -		
„ 10	8 30 A.M.	64 - -	48 - -	102·4	
„ „	8 0 P.M.	65 - -	36; standing, not ruminating.	103·1	
„ 11	8 30 A.M.	61 - -	48; ruminating -	102·7	
„ „	9 0 P.M.	60; standing -	42 „ -	102·4	
„ 12	9 0 A.M.	64 - -	50; coughing occasionally. 46; standing	102·1	Coat rather dry and staring; fæces rather soft, dark coloured, and slightly offensive; ruminates regularly.
„ „	9 0 P.M.	74; standing and feeding.	35; not ruminating	102·3	
„ 13	8 0 A.M.	60; standing -	32; standing, not ruminating.	102·1	
„ „	8 0 P.M.	62 - -	44; not ruminating	102·5	
„ 14	8 30 A.M.	58 - -	32 „ -	102·2	
„ „	— P.M.	61 - -	46; ruminating -	102·8	
„ 15	8 30 A.M.	64 - -	40 „ -	103·8	
„ „	9 0 P.M.	58 - -	64; not ruminating	102·9	
„ 16	9 0 A.M.	54 - -	46 „ -	102·2	
„ „	9 0 P.M.	58 - -	40 „ -	102·4	
„ 17	9 0 A.M.	62 - -	34 - -	101·9	Tendency to diarrhœa; fæces dark-coloured and offensive; sphincter ani relaxed.
„ „	9 0 P.M.	69 - -	78 - -	102·2	
„ 18	— A.M.	62 - -	86 - -	102·9	
„ „	— P.M.	70 - -	58; ruminating -	102·0	
„ 19	9 0 A.M.	72 - -	64 „ -	102·8	Fæces still soft, dark-coloured, and offensive.
„ „	9 0 P.M.	72 - -	87; not ruminating	103·2	
„ 20	9 0 A.M.	66 - -	72 „ -	Not recorded	
„ „	8 0 P.M.	72 - -	83 - -		
„ 21	8 0 A.M.	72 - -	76; ruminating -	102·5	
„ „	9 0 P.M.	76; ruminating -	59 - -	101·9	
„ 22	8 0 A.M.	72 - -	About 90, irregular; ruminating.	102·6	The animal licks itself constantly.
„ „	9 0 P.M.	73 - -	84 - -	103·2	
„ 23	8 0 A.M.	72; ruminating -	80 - -	101·9	
„ „	9 0 P.M.	72; standing -	76; ruminating -	102·8	
„ 24	8 0 A.M.	71 - -	50 „ -	102·7	
„ „	8 0 P.M.	72 - -	72 „ -	102·7	
„ 25	8 0 A.M.	76; ruminating -	80 - -	102·9	
„ „	8 0 P.M.	76 - -	74; ruminating -	102·9	
„ 26	8 0 A.M.	70; ruminating -	58 „ -	101·3	
„ „	8 0 P.M.	74 - -	52 - -	101·4	
„ 27	8 0 P.M.	76 - -	60; ruminating -	102·1	
„ 28	9 0 A.M.	72 - -	48 - -	102·0	
„ „	8 0 P.M.	74 - -	58 - -	Not recorded	
„ 29		Not recorded.			
„ 30		Ditto - - -	- - -		Has been purging yesterday and to day.
Dec. 1	8 0 P.M.	70 - -	46 - -	102·2	*Inoculation performed this evening.*
„ 2	8 0 A.M.	72 - -	64 - -	102·1	Animal weighed; weight 406½ lbs. Increase since Nov. 8th = 15½ lbs.
„ „	8 0 P.M.	80 - -	66 - -	102·6	
„ 3	— A.M.	68 - -	76 - -	102·6	
„ „	— P.M.	74 - -	34 - -	102·9	
„ 4	— A.M.	70 - -	55 - -	104·6	
„ „	8 0 P.M.	84 - -	56 - -	105·4	
„ 5	8 0 A.M.	76 - -	66; standing -	105·3	The visible mucous membranes were examined at 2 P.M. and found normal; the mouth of a uniform pale pink.
„ „	8 0 P.M.	76 - -	56; ruminating -	106·6	
„ 6	8 0 A.M.	68 - -	56 - -	106·2	
„ „	8 0 P.M.	67 - -	62 - -	106·1	The animal eats only about a third of its usual allowance. A distinct red line is observed along the edges of the teeth, and a few small opaque white elevations inside the lower lip, about the size of a pin's head.
„ 7	8 0 A.M.	63 - -	64 - -	106·1	Appears dull, and is not feeding; no discharge from eyes nor nose; muzzle dry.
„ „	8 0 P.M.	64 - -	74 - -		A continuous chain of aphthous* patches is now observed inside the lower lip; most marked opposite the corner teeth. Red line on gum same as last night.
„ 8	— A.M.	62, weaker -	80 - -	106·3	Legs and ears cold; coat staring. The thermometer is grasped by the sphincter ani. Constipation. The animal looks dull and eats very little. There is a mucous discharge from the nose. The aphthous patches in the mouth are extending.
„ „	— P.M.	66, stronger, but still weak.	30 - -	106·4	
„ 9	8 0 A.M.	62, weak and thready.	41 - -	106·0	
„ „	8 0 P.M.	— - -	36 - -	105·6	Patches on lower lip much increased; excoriation of the commissures of the lips. Large quantities of epithelium peel off in opening the mouth. Considerable increase of discharge from nose. The papillæ at the anterior part of the mouth present here and there scarlet patches, each of which is generally observed at the base of a papilla, but seldom extends around the whole of it. Along the borders of the tongue, near the tip, there are some clusters of well-marked white elevations, presenting the same appearance as those first observed inside the lip on the 8th instant.

* The word "aphthous" is used in this and the following cases to designate the material of which the characteristic concretion on the mucous membrane of the mouth consists, not because it expresses its nature, but merely for convenience.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Dec. 10	— A.M.	68 - -	28 - -	104°·9	The glottis is closed after each inspiration. Expiration is accompanied with a peculiar catch and heaving of the chest. Constipation. The thermometer is grasped by the sphincter ani.
„ „	— P.M.	76 - -	22 - -	103·7	The coat is staring; legs and ears cold. The abraded patches on the lip are of a paler hue, and are evidently healing, the abraded surfaces being now replaced by slightly red patches, with indistinct smooth edges, and without indentation. The epithelium is peeling off the hard palate, leaving pink depressed patches. The tongue presents the same appearance as yesterday. The discharge from the nose continues.
„ 11	8 0 A.M.	62 - -	19 - -	103·2	The respiration continues the same in character as yesterday, but is accompanied with less noise. Constipation continues.
„ „	— P.M.	64 - -	22 - -	102·7	Is eating a little this afternoon. Diarrhœa now exists. On examination of the lower lip the abrasions are found to be healed, only leaving two small indistinct patches at the base of the gum. The white elevations on the tongue are diminished. The hard palate presents the same appearance as before. The papillæ at the anterior part of the mouth are still red, but the excoriations which were observed at the commissures of the lips are healed. The skin on the chin appears excoriated, as if the epidermis were peeling off in the same manner as the epithelium of the mouth did, and the hair growing from the excoriated skin is matted together with dried discharge. On the withers are several spots of an eruption the same in character as that on the chin. The discharge from the nose is diminished, but the lachrymal secretion increased.
„ 12	8 0 A.M.	56, exceedingly weak.	26; ruminating -	102·5	Respiration has the same sound as before described.
	8 0 P.M.	64 - -	31 „ -	103·7	Is eating a little; still purging. Mucous membrane of mouth looks more healthy; the discharge from the eyes and nose same as last night. The chin appears drier to night; the eruption on the skin of the withers as before. Under the tail the epidermis is peeling off.
„ 13	8 0 A.M.	58 - -	26; ruminating -	102·5	Respiration same as before in character.
„ „	— P.M.	74 - -	22 „ -	102·9	Animal is feeding still better to day; still purging. The mouth looks healthy; nose cleaner; discharge from eyes continues. Skin of withers presents the same eruption as before.
„ 14	8 0 A.M.	64 - -	27 - -	102·6	
„ „	8 0 P.M.	70 - -	24; ruminating -	104·2	Feeding; not purging so much. Respiration more natural. Eruption on skin drier. Mouth looks healthy, except in one spot on the dorsal surface of the tongue where the epithelium is detached, leaving a depression of a pale colour with hard edges. Nose clean; eyes running a little.
„ 15	8 0 A.M.	66 - -	24 - -	102·8	Respiration as last night.
„ „	8 0 P.M.	76 - -	21; standing -	103·7	Animal is eating about its usual allowance of turnips. The ulcer on the tongue is enlarged, oval in shape. Increased running from eyes. A spot on the chin near the middle of the seat of the former eruption seems deeper as if ulcerating.
„ 16	8 0 A.M.	72 - -	30 - -	102·2	
„ „	8 0 P.M.	78 - -	27; standing -	102·4	Animal has had diarrhœa to-day very badly, worse than previously. Discharge from eyes continues. The ulcer on the tongue is enlarged to about the size of a sixpence, circular in form, with clean cut edges; epithelium of the tongue appears healthy to the very border of the ulcer. The ulcerated surface is rough, deepest in the centre, grey in some parts, in others pale pink but not at all red. At the part of the chin previously described there is a rounded deep ulcer, with ragged swollen edges; its base exhibits granulations covered by yellowish white matter.
„ 17	8 0 A.M.	62 - -	24 - -	102·1	Respiration now normal.
„ „	8 0 P.M.	80 - -	32 - -	103·6	Fæces are more solid to-day. Increase of discharge from the eyes; enlargement of ulcer on tongue; its deepest parts appear red, with the elevated spots white.
„ 18	8 0 A.M.	64 - -	22 - -	102·0	
„ „	8 0 P.M.	72 - -	23; standing -	103·0	Discharge from eyes continues the same. Ulcer on tongue still larger, now of an irregular triangular shape, its surface is smoother, and looks more healthy.
„ 19	8 0 A.M.	66 - -	30; ruminating -	101·2	
„ „	8 0 P.M.	72 - -	27; standing -	102·4	Less discharge from eyes. The ulcer on the tongue is found to be extending backwards; the anterior portion appears of a uniform red colour as if healing. The eruption is extending from about the anus to the skin between the thighs, and to the scrotum.
„ 20	8 0 A.M.	72 - -	32 „ -	103·2	The eyes and nose are clean. The ulcer on the tongue is still extending backwards, whilst its anterior part is healing. [On the following day it had assumed an hour-glass shape, and was seen to be still healing, except at the posterior part, where it had irregular edges, and was still covered by a greyish crust.]

Dr. Sanderson. Report to Commissioners.

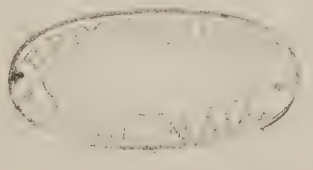
CASE No. 3.—A red and white bullock, weighing 552 lbs.* Under observation before infection from November 8th December 13th; after infection from December 13th to December 19th.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Urine in 24 hours. Quantity of Urea.	Urine in 24 hours. Quantity of Urine.	Remarks.
				°	Grains.	Fluid oz.	
Nov. 8	3 30 P.M.	54	34 to 38.	—	—	—	
„ 9	8 30 A.M.	58	32.	—	—	—	
„ „	7 30 P.M.	66	36; irregular.	—	—	—	
„ 10	8 30 A.M.	56	24; irregular	102·1	—	—	The rate of breathing recorded in the appropriate column as 24, was found soon after to have reached 40 per minute; the animal was not ruminating.
„ „	8 0 P.M.	64	48; ruminating	101·6	—	—	
„ 11	8 30 A.M.	58	48	102·4	—	—	
„ „	9 0 P.M.	71	64; ruminating	102·4	—	—	
„ 12	9 0 A.M.	60	41	101·7	—	—	The respirations still vary. Whilst the animal was still lying they were found to have diminished to 20, a catch being at the same time audible. Again, when standing, the number had increased to 41.
„ „	— P.M.	63	48	101·6	—	—	
„ 13	8 0 A.M.	58	36; standing, not feeding.	102·1	—	—	
„ „	— P.M.	67	59; ruminating	102·2	—	—	
„ 14	8 30 A.M.	60	28; not ruminating	101·8	—	—	
„ „	— P.M.	77	66; ruminating; belly full.	102·8	—	—	
„ 15	8 30 A.M.	72	50; ruminating	101·9	—	—	
„ „	9 0 P.M.	61	56 „	101·8	—	—	
„ 16	9 0 A.M.	64	36; not ruminating	102·0	—	—	
„ „	9 0 P.M.	58	52 „	102·2	—	—	
„ 17	9 0 A.M.	58	34; ruminating	101·8	—	—	
„ „	9 0 P.M.	62	80. hurried and unnatural.	102·4	—	—	Was placed in the lead covered stall last night that the urine might be collected for examination, and seems much annoyed in consequence.
„ 18	9 0 A.M.	56	42, irregular	101·6	—	—	
„ „	9 0 P.M.	71	66; not ruminating	102·4	—	—	
„ 19	9 0 A.M.	63	58, irregular;	102·4	—	107½	
„ „	9 0 P.M.	65	not ruminating.	102·3	—	—	
„ 20	9 0 A.M.	72	75	—	—	83	
„ „	8 0 P.M.	67	68	—	—	—	
„ 21	8 0 A.M.	67	68	102·0	—	136	
„ „	9 0 P.M.	74; standing	72	102·4	—	—	Animal still seems uncomfortable in its new stall.
„ 22	8 0 A.M.	62	45 to 50, irregular.	101·6	—	132	
„ „	9 0 P.M.	76	60 to 64	101·4	—	—	
„ 23	8 0 A.M.	67	68	101·4	—	130	
„ „	9 0 P.M.	70	32	102·2	—	—	
„ 24	8 0 A.M.	72; standing	64	101·4	—	116½	
„ „	8 0 P.M.	72; standing	56	102·3	—	—	
„ 25	8 0 A.M.	60	60	100·8	—	76	Urine scanty. Rectum empty, so that the bulb of the thermometer moved in it freely; hence the unusually low reading.
„ „	8 0 P.M.	64	58 to 60	102·3	—	—	
„ 26	9 0 A.M.	59	48	101·3	—	98	
„ „	8 0 P.M.	68	54	101·3	—	—	
„ 27	8 0 A.M.	66; standing	44	—	—	103	
„ „	8 0 P.M.	66	64	102·1	—	—	
„ 28	9 0 A.M.	62	52	101·8	930·40	87	
„ „	8 0 P.M.	73	70	101·9	—	—	Animal is rather restless.
„ 29	No observations made.				1094·90	95	
„ 30					1156·36	96	
Dec. 1	8 0 P.M.	72	64; standing	101·8	1290·33	115	
„ 2	8 0 A.M.	73	64	101·5	—	88	Weighed this morning; weight 565 lbs.; increase since Nov. 8th = 13lbs.
„ „	8 0 P.M.	78	76; ruminating	—	—	—	
„ 3	— A.M.	67	36 „	101·6	—	—	
„ „	— P.M.	74	60 „	101·9	—	—	
„ 4	8 0 P.M.	74, irregular	56	101·8	1485·12	116	
„ 5	8 0 A.M.	62	52	103·6	1021·62	90	The mucous membrane of the mouth generally is of a pale healthy colour, but is red round the edges of the teeth.
„ „	8 0 P.M.	65	48	101·2	—	—	
„ 6	8 0 A.M.	62	42; standing	101·1	1087·83	83	The animal is feeding as usual.
„ „	8 0 P.M.	64	64	101·6	—	—	
„ 7	8 0 A.M.	60	46; standing	101·1	1220·10	97	
„ „	8 0 P.M.	67	68	102·0	—	—	The mucous membranes appear healthy.
„ 8	— A.M.	57	60	101·2	1186·46	111½	
„ „	— P.M.	72	62; ruminating	102·0	—	—	
„ 9	8 0 A.M.	58	44	101·5	1121·80	112½	
„ „	8 0 P.M.	64	48; standing	101·5	—	—	
„ 10	— A.M.	60	42	101·4	1248·66	110	
„ „	— P.M.	66	38; ruminating	101·5	—	—	
„ 11	8 0 A.M.	60	31 „	101·4	1208·68		
„ „	8 0 P.M.	62	40	101·8	—	—	

* *See* Dr. Bristowe's Report, No. 30.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Urine in 24 Hours.		Remarks.
					Quantity of Urea.	Quantity of Urine.	
					Grains.	Fluid oz.	
Dec. 12	8 0 A.M.	66	44	101°2	1305·00	74	
„ „	8 0 P.M.	62	38	101·9	—	—	
„ 13	8 0 A.M.	66	42; ruminating	101·9	1018·22	88	
„ „	8 0 P.M.	78	50; standing	103·3	—	—	
„ 14	8 0 A.M.	64	64	103·9	1129·04	97	
„ „	— P.M.	76	54	105·6	- -	- -	On examination of the mouth an elongated white patch is found on the mucous membrane, at the left side of the lower lip, close to the cicatrix of an old ulcer; and at the edges of two of the teeth two small slate-coloured spots are seen.
„ 15	8 0 A.M.	61	49	105·1	1130·89	76	A catch is heard in expiration, so that the rate of respiration is 64 per minute, although the actual number is 49.
„ „	8 0 P.M.	66, thready, very much altered in character.	52; standing	105·4	- -	- -	To-night the white patch on the lower lip, observed yesterday, is not distinctly seen.
„ 16	8 0 A.M.	60	60	105·9	1172·41		
	— P.M.	66	57	106·2	- -	- -	Three or four small white elevations are seen near the seat of the old ulcer, on the left side of the lower lip. On the upper gum there is a red streak along the edges of the papillæ. The mucous membrane of the mouth generally is reddened; the papillæ being of a pale pink colour. The evacuations from the bowels are becoming harder than before, and to-night mucus and blood were passed with some fæces. The animal is not feeding.
„ 17	8 0 A.M.	68, weak and thready.	44	106·7	906·32	44	The bullock lies with his head laid along the ground, and allows himself to be handled without moving.
„ „	8 0 P.M.	68	68, rather quick, or 36, moaning, and slow.	105·6	- -	- -	On examination of the mouth, the patch at the left side of the lower lip is found abraded in the centre. A distinct excoriated patch is seen below the necks of the two corner teeth, on the right side, having a few small elevated specks near it. This patch has become enlarged since morning. There is increased redness of all the papillæ on the left side, some of which are of a deep hue, and are abraded. Below the anus there are some spots of eruption. Has eaten nothing.
„ 18	8 0 A.M.	60, very weak and thready.	36; moaning	105·0	1568·31	71	The fæces are very hard and dry. The animal lies, and does not move when touched. Has eaten nothing.
„ „	8 0 P.M.	78; very weak	46; moaning	106·2	- -	- -	The eruption below the anus is seen quite distinctly, and has a greasy appearance. On the upper lip there are a number of white elevated well-marked specks, more numerous on the right side; the lower lip is spotted. The papillæ are rather deeper in colour than last night. The catch heard in the pause between inspiration and expiration is combined with a low moan. The animal is eating almost nothing. To-night the fæces are a little softer, and covered with mucus of a slightly red colour. Some of the urine collected contains albumen, and has an alkaline reaction.
„ 19	8 0 A.M.	80 to 88, varying	-	106·2	2042·31	147	In inspiration the larynx advances with contraction of the muscles connecting it with the jaw; but during the whole period of expiration it falls back again. The character of the breathing seems much the same as last night. In expiration, the glottis closes with a loud valvular sound, which is immediately followed by a sound of a loud harsh nature. The animal has eaten nothing since last night. There is diarrhœa; and the saliva flows from the mouth.
„ „	9 0 P.M.	- -	46	- -	- -	- -	Respiration continues of the same character. The animal died about 2·45.*

* The carcase was weighed after death. Weight, 486½ lbs. Loss of weight during the disease, 78½ lbs.



Dr. Sanderson. Report to Commissioners.

CASE No. 4.—A roan heifer, red about the head and neck; weighing 414 lbs. Under observation before inoculation from Nov. 8th to Nov. 30th; after inoculation from Dec. 1st to Dec. 20th.*

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Remarks.
				°	
Nov. 8	3 30 P.M.	59 - -	40.	—	
„ 9	8 30 A.M.	58 - -	17.	—	
„ „	7 30 P.M.	68 - -	42.	—	
„ 10	8 30 A.M.	61 - -	26 - -	101·9	
„ „	8 0 P.M.	68 - -	64; standing; not ruminating.	103·0	
„ 11	8 30 A.M.	61 - -	40; ruminating	102·6	
„ „	9 0 P.M.	59; standing	50; not ruminating	102·2	
„ 12	9 0 A.M.	64; standing -	42 to 48, with pauses.	102·2	
„ „	— P.M.	66 - -	42; ruminating	103.0	
„ 13	7 30 A.M.	56; standing -	28; standing -	102·3	
„ „	— P.M.	66; standing -	15; ruminating	102·9	
„ 14	8 30 A.M.	59; standing -	27; not ruminating	102·4	
„ „	— P.M.	69 - -	76, very irregular; belly very full; not ruminating.	103·3	
„ 15	8 30 A.M.	60 - -	48; not ruminating	103·4	
„ „	9 0 P.M.	57 - -	52; ruminating	102·8	
„ 16	9 0 A.M.	55 - -	38; not ruminating	102·4	
„ „	9 0 P.M.	56 - -	56 to 60 -	102·1	Animal was put in lead-covered stall this afternoon, that the urine might be collected for examination.
„ 17	9 0 A.M.	58; standing -	26; standing -	101·8	
„ „	9 0 P.M.	56; standing -	70; very restless	102·5	
„ 18	9 0 A.M.	56; standing -	31; standing -	101·9	
„ „	9 0 P.M.	74; standing; newly raised.	64; ruminating	102·7	
„ 19	9 0 A.M.	72 „ -	66, very irregular.	102·8	
„ „	9 0 P.M.	69 - -	100; not ruminating.	103·2	
„ 20	9 0 A.M.	66; standing -	54; ruminating	—	
„ „	8 0 P.M.	70 - -	76; not ruminating	—	
„ 21	8 0 A.M.	68 - -	70 „ -	—	Changed this morning from the raised stall in which the animal had been placed for the collection of the urine.
„ „	9 0 P.M.	76; standing -	70; standing -	103·0	
„ 22	8 0 A.M.	60 - -	56 - -	102·9	About 16 oz. of blood taken this morning for analysis.
„ „	9 0 P.M.	79 - -	112; not ruminating.	103·7	
„ 23	8 0 A.M.	78; standing -	82, verified on a second observation; ruminating.	102·9	
„ „	9 0 P.M.	76; standing -	92 - -	103·3	
„ 24	8 0 A.M.	68 - -	89 to 90 -	103·1	12 oz. of blood taken this morning.
„ „	5 0 P.M.	92 to 94 -	86; standing -	103·0	
„ „	8 0 P.M.	90; standing -	92; ruminating	103·6	
„ 25	8 0 A.M.	69 - -	96; tranquil -	102·7	
„ „	8 0 P.M.	73 - -	97 - -	103·2	
„ 26	9 0 A.M.	75 - -	68; ruminating	102·9	
„ „	8 0 P.M.	76 - -	46 - -	101·7	
„ 27	8 0 A.M.	78 - -	68; standing -	103·0	
„ 28	9 0 A.M.	76 to 73 -	37; not ruminating	- - -	Fæces unnaturally soft.
„ „	8 0 P.M.	70 - -	66 - -	—	
„ 29	No observations made.				
„ 30					
Dec. 1	8 0 P.M.	68 - -	50 - -	—	*Inoculation performed this evening.*
„ 2	8 0 A.M.	66 - -	36; ruminating	102·6	Weighed this morning; weight 408½ lbs.; decrease since Nov. 8th = 5½ lbs.
„ „	8 0 P.M.	72; standing -	68 - -	103·4	Fæces soft.
„ 3	— P.M.	78 - -	16, pause between inspiration and expiration.	103·6	
„ 4	— A.M.	70 - -	50 - -	104·0	
„ „	8 0 P.M.	84 - -	88 - -	105·4	Slight tenesmus; animal occasionally straining, with a grunting noise.
„ 5	8 0 A.M.	74 -	60; standing -	106·2	Diarrhœa; evacuations smell very offensive.
„ „	8 0 P.M.	76 - -	66 - -	106·7	On examination of the mucous membrane of the mouth an indistinct red line is observed on the margin of the lower gum, at the necks of the teeth. The mucous membrane of the rest of the mouth appears normal, of a pale pink colour; the vagina natural.
„ 6	8 0 A.M.	78 - -	58; standing -	106·7	
„ „	8 0 P.M.	72 - -	80 - -	107·2	The animal is eating only a third part of its usual allowance. The red line along the margin of the gum is more distinct; inside the lower lip there are several small opaque white elevations, two of which, near the middle of the lip, are abraded and exhibit a white elevated margin with a red spot in the centre. The vagina appears a little redder than last night, and its mucous membrane is covered with a thick creamy discharge.
„ 7	8 0 A.M.	70 - -	43; standing -	106·8	Is eating a little.

* This animal was killed for pathological research on the 22nd of December. See Dr. Bristowe's Report, No. 32.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Remarks.
Dec. 7	8 0 P.M.	72 - -	58; standing -	106·9	Animal is very dull. The aphthous patches inside the lower lip are considerably increased in number; they are most marked opposite the corner teeth and near the frœnum. The mucous membrane of the vagina has much the same appearance as last night; the discharge is not altered in appearance, but is considerably increased in quantity.
,, 8	— A.M.	70 - -	54; standing -	107·0	Not feeding.
,, ,,	— P.M.	75 - -	67 - -	106·8	The temperature of the legs and ears is about normal. The aphthous patches on the lip have extended, and some of them appear very red in the centre, as if the epithelium there were detached; their margins are white and elevated. The vaginal mucous membrane is red, and the creamy discharge is more abundant. The thermometer is distinctly grasped by the sphincter ani.
,, 9	8 0 A.M.	66 - -	40 - -	107·2	The lachrymal secretion is increased this morning. When the thermometer was introduced into the rectum the glutæal muscles twitched, as if the animal suffered pain. Is eating but very little.
,, ,,	— P.M.	76 weak, ; standing.	40 - -	106·7	There are considerable pauses between the respirations, and a slight blowing noise. The abraded surfaces on the lip have considerably increased in extent. The patches described as very red in the centre last evening are now of a paler hue, whilst other newly abraded spots have assumed an intense red, the same in appearance as was observed in those described last evening. At the angles of the mouth and along the margin of the lower lip there are a number of small red spots with indented edges, many of them confluent. The papillæ at the anterior part of the mouth present here and there scarlet patches; these are generally situated at the bases of the papillæ, but only occasionally extend round them. On examination with a lens, the patches are seen to be depressed. Along the borders of the tongue near the tip there are some clusters of well-marked white elevations, presenting the same appearance as those seen first on the lower lip. The coat is staring to-night; the muscles twitch when the animal is touched. Constipation; the fæces are passed in hard round masses.
,, 10	— A.M.	64, very weak -	56, with moaning at each respiration.	105·8	
,, ,,	8 0 P.M.	76 - -	38, with pause after each inspiration, and a slight catch; standing.	103·7	The vagina looks more healthy to-night and the discharge is diminished. On the upper lip there are two distinct white elevated patches opposite the corner incisors, one on each side of the lip. The whole surface of this portion of the mucous membrane feels rough to the finger. There are groups of elevated white patches on the lower lip along the base of the gum, and between the necks of the teeth; besides these, there are patches of large extent, which are red and denuded like those previously described; the rest of the mucous membrane has a dull, white, sodden appearance. The tongue appears much the same as last night, but the white elevations are extending more to the under surface. There is increased discharge from the nose of a glutinous character. The eyes have a peculiar sunken appearance, and at the inner canthus the hairs are matted by the lachrymal secretion. The coat is still staring, and the twitching of the muscles, when the animal is touched, continues.
,, 11	8 0 A.M.	60, weak -	42; standing, with pauses as before.	102·8	Constipation. There is no distinct grasping of the thermometer by the sphincter ani.
,, ,,	— P.M.	72 - -	33, with pauses, but less noise.	103·9	The fæces are softer to-night; the animal has been eating a little this afternoon. The vagina is now almost normal in appearance. On the lower lip there is one distinct patch at the frœnum covered by a white elevation. The colour of the papillæ is fainter this evening; the tongue clean. An eruption is observed on the chin, with excoriation of the skin as if the epidermis were peeling off in the same way as the epithelium peels off the mucous membrane; the hair of the chin is matted with the discharge. This eruption also extends along the nape of the neck from the withers to the poll and to the roots of the ears. There is less discharge from the nose; the eyes are in the same condition as last night.
,, 12	8 0 A.M.	72 - -	32; standing -	103·4	Fæces soft this morning, but no purging.
,, ,,	8 0 P.M.	80 - -	23; expiration accompanied by a sort of grunting noise	105·2	Diarrhœa; has eaten about 2lbs of turnips to day, but scarcely any hay. The vaginal mucous membrane is of a uniform and natural colour, but is covered with tenacious mucous discharge, with which the tail is also smeared; the epidermis is peeling off the skin under the tail and round the anus; there are some small spots of eruption between the thighs. The skin on the nape of the neck is much drier; the eruption on the chin appears much the same; the mucous membrane of the mouth looks more healthy; the discharge from eyes and nose continues much the same.
,, 13	8 0 A.M.	76 - -	30; standing, and ruminating.	103·2	
,, ,,	8 0 P.M.	70 - -	32; standing -	103·4	The animal is purging badly; has eaten better to-day. The vagina appears healthy, no discharge; the epidermis is still peeling off around the anus; eruption between thighs continues as described last night. The eruption on the skin is spreading to the right side. The mucous membrane of the mouth is healthy. The discharge from the eyes and nose continues.
,, 14	8 0 A.M.	78 - -	26 - -	102·4	
,, ,,	8 0 P.M.	78 - -	80; ruminating	104·2	Less purging to-day. The vagina continues healthy; the mouth is of a uniform pale pink. The eyes are running, but the nose clean. The skin of the chin and neck appears unaltered, but the eruption between the thighs is spreading upward to the vulva.
,, 15	8 0 A.M.	60 - -	23, with a catch in expiration.	101·5	
,, ,,	8 0 P.M.	76 - -	66; ruminating	103·8	The purging has ceased; the fæces are almost normal in appearance; the animal eats about the usual allowance of turnips. The lachrymal discharge continues as last night. Near the commissures of the lips there are several sores at the seat of the former eruption. The eruption on the thighs has extended up to the vulva.
,, 16	8 0 A.M.	62 - -	24 - -	101·6	

Date.	Hour.	Pulse.	Respirations.	Temperature. (Fahr.) in Rectum.	Remarks.
Dec. 16	8 0 P.M.	64 - -	22 - -	102·2°	Fæces normal; the animal is feeding pretty well. The discharge from the eyes continues. The mouth is clean; the sores near the commissures of the lips appear as simple cracks in the epidermis; no ulcers. The eruption on the nape of the neck is now dry and scaly; the lower part of the neck feels clammy as if an eruption were about to occur. On the left side there is a swelling around a wound made in bleeding the animal, and to night some drops of pus escaped when the pin was removed. The eruption extends from the thighs continuously to the vulva and to the udder.
„ 17	8 0 A.M.	60 - -	23 - -	101·8	
„ „	8 0 P.M.	68 - -	31 - -	101·8	The eruption on the skin as last night. The mucous membranes appear healthy; the eyes and nose clean.
„ 18	8 0 A.M.	60 - -	24; standing -	101·2	
„ „	8 0 P.M.	67 - -	38; ruminating	101·9	The animal is feeding well.
„ 19	8 0 A.M.	64 - -	32 - -	101·6	
„ „	8 0 P.M.	56 - -	16; standing -	101·2	
„ 20	8 0 A.M.	72 - -	50; standing -	102·6	The animal was bled this afternoon; the blood was forwarded to Dr. Marcet for analysis.

Case No. 5.—A horned milk cow, mostly red, but white under the belly and on the hind legs, weighing 1,036lbs. Age about 7 years.*

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Milk in 24 hours. Quantity of Milk.	Milk in 24 hours. Quantity of Cream.	Remarks.
					Fluid oz.	Degrees.	
Nov. 14	2 0 P.M.	70 - -	22; standing -	101·3°			
„ „	8 30 P.M.	80 - -	32; not ruminating	101·6			
„ 15	8 30 A.M.	68; standing -	24 - -	101·1			
„ „	9 0 P.M.	61 - -	32 - -	100·9			
„ 16	9 0 A.M.	57 - -	27 - -	101·1			
„ „	9 0 P.M.	78; standing, restless.	30; standing -	101·3			
„ 17	9 0 A.M.	58; standing -	34; ruminating	101·1			
„ „	9 0 P.M.	72 - -	40; not ruminating	100·8			
„ 18	9 0 A.M.	56 - -	26 „	100·9			
„ „	9 0 P.M.	63 - -	38; standing -	101·5	26	22½	
„ 19	9 0 A.M.	54, animal very tranquil.	28 to 30; not ruminating.	101·4			
„ „	9 0 P.M.	64 - -	32; not ruminating	101·5	41		
„ 20	9 0 A.M.	62; standing -	26; standing -	No observation made.			
„ „	8 0 P.M.	62 „	37 „		45	21	
„ 21	9 0 P.M.	59 - -	34 - -	101·2	51	21	The animal was moved into another stable this morning.
„ 22	8 0 A.M.	64; standing -	20; standing -	101·1			
„ „	9 0 P.M.	56 - -	28; before milking	100·9	49½	23	
„ 23	8 0 A.M.	56; standing -	18; standing; before milking.	101·8			
„ „	8 0 P.M.	62 - -	32; standing, and feeding.	101·4	52½	22	
„ 24	8 0 A.M.	57; standing -	19; standing -	101·2			
„ „	8 0 P.M.	70 „	26; standing; restless.	101·2	32	24	The animal is very restless to night, and gave only about 3 ozs. of milk; probably in consequence of noise overhead.
„ 25	8 0 A.M.	60 „	21; standing -	100·7	- -	- -	Seems a little excited this morning; yielded more milk than usual; discharge from vagina of a colourless viscid fluid.
„ „	8 0 P.M.	70 „	26 „	101·2	67	29	
„ 26	9 0 A.M.	58 „	24 „	100·4			
„ „	8 0 P.M.	68 „	28 „	101·0	49½	28	
„ 27	8 0 A.M.	62; ruminating	23; ruminating.				
„ „	8 0 P.M.	65; standing -	20; standing -	101·0	50½	19	
„ 28	9 0 A.M.	58 - -	30 - -	100·9			
„ „	— P.M.	67; standing -	36 to 40; standing	- -	43½	17	
„ 29	No observations made		- - -	- -	48	19	
„ 30					50	19	
Dec. 1	8 0 P.M.	64; standing -	36; standing -	100·9	51	19	
„ 2	8 0 A.M.	62 - -	24 „	100·9			
„ „	8 0 P.M.	- - -	20 „	- -	48	18	
„ 3	8 0 A.M.	56 - -	24; ruminating	101·2			
„ „	8 0 P.M.	62; standing -	34 - -	101·6	48	18	
„ 4	— P.M.	68 „	36 - -	101·4	46	20	
„ 5	8 0 A.M.	60 - -	37 - -	101·2			
„ „	8 0 P.M.	57 - -	23 - -	101·2	45	25	
„ 6	8 0 A.M.	62 - -	24 - -	101·4			
„ „	8 0 P.M.	52 - -	25 - -	101·4	36	20	
„ 7	8 0 A.M.	60 - -	24; standing -	101·4			
„ „	8 0 P.M.	66 - -	30 „	101·2	40	- -	The vagina is redder than natural, with three small elevations on the surface of the mucous membrane.
„ 8	8 0 A.M.	56 - -	30 „	101·5			
„ „	— P.M.	56 - -	24 - -	101·3	48	20	
„ 9	8 0 A.M.	50 - -	26 - -	101·5			

* *See* Dr. Bristowe's Report, No. 31.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Milk in 24 hours. Quantity of Milk.	Milk in 24 hours. Quantity of Cream.	Remarks.
					Fluid oz.	Degrees.	
Dec. 9	8 0 P.M.	- - -	24 - -	100·5	45½	18½	
„ 10	— A.M.	60; standing -	23; ruminating	100·3 (or thereabouts).	- - -	-	The animal is very restless this morning, so that the thermometer could not be properly introduced into the rectum.
„ „	— P.M.	60 - -	27; standing -	101·1	44½	18	Still restless, while the temperature was being noted.
„ 11	8 0 A.M.	64 - -	22; standing, and eating.	101·9	- - -	-	Is a little fidgety, but the thermometer was introduced without difficulty.
„ „	8 0 P.M.	60 - -	22; standing -	101·3	45	19	
„ 12	8 0 A.M.	50 - -	23 - -	101·2			
„ „	8 0 P.M.	65 - -	28; standing -	101·1	46	25	
„ 13	8 0 A.M.	56 - -	24 - -	100·9			
„ „	8 0 P.M.	62 - -	23; standing -	101·2	46	19	
„ 14	8 0 A.M.	58 - -	24.				
„ „	— P.M.	66 - -	22; standing -	101·4	45		
„ 15	8 0 A.M.	56 - -	32 - -	101·8			
„ „	8 0 P.M.	63 - -	32; standing -	100·8	- -	18	
„ 16	8 0 A.M.	56 - -	25; ruminating	102·8			
„ „	8 0 P.M.	66 - -	32 - -	103·2	33	9	
„ 17	8 0 A.M.	52 - -	27 - -	103·7			
„ „	8 0 P.M.	58 - -	31 - -	104·4	31	- -	There is a slight discharge from the vagina, but on examination the mucous membrane appears healthy, and of a uniform colour. The papillæ within the mouth appear redder than natural. The animal has been changed to a lead-covered stall to day that the urine may be collected.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Urine in 24 hours. Quantity of Urea.	Urine in 24 hours. Quantity of Urine.	Milk in 24 hours. Quantity of Milk.	Milk in 24 hours. Quantity of Cream.	Remarks.
					Grains.	Fluid oz.	Fluid oz.	Degrees.	
Dec. 18	8 A.M.	60 - -	44 - -	104·8	—	—	—	—	
„ „	8 P.M.	58 - -	56 - -	104·7	1754·76	220	4	—	The discharge from the vagina continues, and the mucous membrane is found of a deeper red colour. The gums are to a doubtful degree reddened; the lower lip exhibits over its whole surface white elevated specks, most of which are the size of a pin's head, but one or two of them occurring below the left corner tooth are a little larger. The animal has eaten very little to day; the fæces have become harder.
Dec. 19	8 A.M.	65 - -	52 - -	104·0	—	—	None	—	
„ 19	8 P.M.	70 - -	48 - -	104·9	1220·75	161	„	—	There is now an abundant discharge from the vagina of a tenacious character; the mucous membrane is intensely red, and is dotted with white elevated specks. In the left nostril a single elevated speck is observed. All along the upper lip there is a pink blush, and at the left side one doubtful looking white speck. The lower lip presents abundant clusters of confluent white elevations, and around these clusters the mucous membrane is reddened, but there are no red erosions. The under surface of the tongue is beset for about three inches with groups of white elevations. The animal is not feeding and appears very dull; the ears droop; the fæces are hard, and covered with mucus of a reddish tinge.
Dec. 20	8 A.M.	71 (weak) -	59; standing; inspiration and expiration are of equal duration.	105·2	—	—	None	—	The animal still appears dull, and does not take its food.
„ 20	8 P.M.	72 (weak). -	68; standing; regular, but hurried, with a distinct blowing noise.	103·6	2021·75	163	„	—	The vaginal mucous membrane is of a brighter red colour, and is covered with a thick sticky yellow discharge; the surface is found on rubbing off the discharge to be covered with white elevated specks. The eyes are dry, but appear sunken; there is a discharge from the nose. The upper lip at the right side is dotted with white elevations; on the lower lip the specks previously observed have extended so that the mucous membrane presents an almost uniform yellowish white sodden appearance. The papillæ are intensely red, many of them excoriated, and between them the epithelium presents the same sodden appearance as upon the lip. The under surface of the tongue is covered with white elevations. Is not feeding and appears very dull; the ears are drooping; the saliva flows from the mouth Constipation.
Dec. 21	8 A.M.	74 - -	92, hurried -	100·6	—	—	None	—	This morning there is diarrhœa.
„ „	12 noon.	- - -	96 - -	99·8	—	—	„	—	
„ „	2 P.M.	82, very weak	96, of the same hurried character, with an occasional low moan.	98·4	—	—	„	—	
„ „	5 P.M.	108 - -	72 - -	—	1423·55	140	„	—	The conjunctiva is very much injected; the eyes are dry, but sunken; the mouth cold and clammy. Death took place at 8 the same evening.

Dr. Sanderson.

Report to Commissioners.

CASE No. 6.—A milk cow. Under observation before inoculation from Nov. 19th to Nov. 30. Under observation after inoculation from Dec. 1st to Dec. 22nd.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Urine in 24 Hours.		Milk in 24 Hours.		Remarks.
					Quantity of Urea.	Quantity of Urine.	Quantity of Milk.	Quantity of Cream.	
				°	Grains.	Fluidozs.	Fluidozs.	Degrees.	
Nov. 19	9 A.M.	66 - -	26; standing -	—	—	—	—	—	The animal very thin; fæces quite fluid.
„ „	9 P.M.	72 - -	58; standing; after milking.	102·3	—	—	144	—	
„ 20	9 A.M.	68 - -	43; standing; after milking.	—	—	—	—	—	The fæces normal.
„ „	8 P.M.	70 - -	58 - -	—	—	—	136	—	
„ 21	8 A.M.	67 - -	45 - -	102·1	—	—	—	—	
„ „	9 P.M.	66 - -	72 - -	101·9	—	—	160	15	The animal seems very uncomfortable since she was placed this morning on the raised stall, in order to collect the urine for examination. The stall is slippery, and the cow has great difficulty in lying down.
„ 22	8 A.M.	60 - -	30; ruminating -	101·7	1302·7	193	—	—	
„ „	9 P.M.	70 - -	66 - -	102·2	—	—	170½	—	
„ 23	8 A.M.	66; standing	40; standing -	101·3	1442·7	211	—	—	Purging; to have more hay allowed and fewer roots.
„ „	9 P.M.	70 - -	42; ruminating, before milking.	101·8	—	—	149½	—	Not purging so badly to-night.
„ 24	8 A.M.	58 - -	16; ruminating -	100·9	1445·5	217½	—	—	Fæces now quite normal.
„ „	8 P.M.	66 - -	54 „ -	101·9	—	—	120	—	
„ 25	8 A.M.	66; standing -	40 - -	101·7	946·7	144	—	—	
„ „	8 P.M.	64 - -	56 - -	101·9	—	—	133	9	
„ 26	9 A.M.	60 - -	22 to 24 -	101·2	1739·2	160	—	—	
„ „	8 P.M.	62 - -	25; ruminating -	—	—	—	135	9	
„ 27	8 A.M.	54 - -	13, with long pause between inspiration and expiration, chest being full.	101·4	1011·9	148	—	—	
„ „	8 P.M.	60 - -	52 - -	101·4	—	—	150	10	
„ 28	— A.M.	52 - -	39; standing -	101·4	2101·3	184½	—	—	
„ „	— P.M.	62 - -	43 „ -	101·6	—	—	—	10	
„ 29	} No observations made.			{	1306·7	138	144	11	
„ 30	}			{	1994·2	175	152	8	
Dec. 1	8 P.M.	64 - -	40; standing -	101·8	1181·1	110	150	11	*Inoculation performed to-day.*
„ 2	8 A.M.	58 - -	30 „ -	101·6	—	—	—	—	Weighed this morning; weight, 632½ lbs.
„ „	8 P.M.	61 - -	37 „ -	—	—	137	121	15	
„ 3	— A.M.	58 - -	22 to 25; ruminating.	102·6	—	—	—	—	
„ „	— P.M.	64 - -	26 - -	102·4	1889·1	131	135	11	
„ 4	— A.M.	60 - -	31, with an occasional low moan.	104·2	—	—	—	—	The animal is very dull this morning.
„ „	8 P.M.	64 - -	60 - -	105·2	2071·3	162½	144	20	The movements of the belly in respiration are much increased; the head is moved backwards in inspiration and forwards in expiration; expiration is accompanied by a slight blowing noise, and some movement of the limbs. As far as can be ascertained, the animal has not been feeding during the afternoon, but was observed ruminating to night. The appetite is good; more water was consumed than usual. Fæces are more solid than previously.
„ 5	8 A.M.	64; standing	29; standing and ruminating.	104·1	—	—	—	—	The animal's appearance this morning is perfectly healthy.
„ „	8 P.M.	72 - -	50; standing -	105·6	2136·8	176	Lost	—	The mucous membrane of the vagina is a little redder than natural; the other visible mucous membranes appear healthy.
„ 6	8 A.M.	57 - -	39 - -	105·6	—	—	131	—	The appetite continues good; the fæces are softer.
„ „	8 P.M.	64 - -	30; standing and ruminating.	106·0	2110·0	177	—	—	The mucous membrane of the vagina appears injected, and there are at the right side several small white opaque elevations, each about the size of a pin's head; there is, however, no discharge observed.
„ 7	8 A.M.	60 - -	34; standing -	105·2	—	—	102	—	There is no discharge from any of the mucous membranes.
„ „	8 P.M.	66 - -	60 - -	106·4	2472·0	200	—	—	The redness of the vagina is increased; otherwise its appearance is the same as last night. Inside the lower lip, to the right side of the frœnum, a patch of small elevations is distinctly seen.
„ 8	— A.M.	60 - -	42 - -	106·8	—	—	87	—	The appetite is still good

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum	Urine in 24 Hours.		Milk in 24 Hours.		Remarks.
					Quantity of Urea.	Quantity of Urine.	Quantity of Milk.	Quantity of Cream.	
				°	Grains.	Fluid oz.	Fluid oz.	Degrees.	
Dec. 8	– P.M.	68 - -	46 ; standing and ruminating.	107·3	2295·0	220	—	—	The vagina presents a mottled appearance to-night; it is very red, and the surface here and there is covered by a creamy fluid. The lower lip is very red and exhibits a continuous chain of aphthous patches. There is an aphthous looking patch inside the left nostril on the septum nasi. The lachrymal secretion is increased, and below the inner canthus the hairs are wet.
„ 9	8 A.M.	69 - -	38 - -	105·8	—	—	54	—	
„ „	– P.M.	72 - -	34 ; standing -	104·9	1924·5	134	—	—	The vagina is of a uniform intense scarlet colour, with a creamy discharge upon parts of its surface, as described last evening. The aphthous patches in the mouth are not much increased in extent, but they present a more ulcerated appearance than last night ; the whole mucous membrane is reddened, raw looking, and uneven, but very few of the small white elevations are now visible.
„ 10	– A.M.	60 - -	24, quite normal	102·2	—	—	48	25	The animal is still feeding and ruminating ; seems to suffer pain while being milked ; there is a tendency to diarrhœa ; no turnips were given last night.
„ „	8 P.M.	68, weaker -	34, regular, but a blowing noise in expiration.	104·6	1967·5	124	—	—	The animal is purging, but seems lively ; is still feeding well, and ruminating ; has had no turnips to-day. The vagina is found to be of a duller hue, is œdematous, and the surface is drier than last night ; here and there it has a pitted appearance ; the discharge is diminished in quantity. The eye is clear, no tears run down the check ; the membrana nictitans appears a little swollen. The lower lip and papillæ look much the same as last night ; on the hard palate are some small pink spots.
„ 11	8 A.M.	60 ; stronger	24 ; standing and eating.	103·0	—	—	85	—	The diarrhœa is worse, but the animal still lively.
„ „	8 P.M.	59 - -	30 - -	101·4	1423·8	91	—	—	Still purging ; turnips given this afternoon. On examination of the vagina it is found less œdematous, but still uneven and patchy; on the whole, it appears more healthy and paler in colour. On the left side of the lower lip, opposite the corner tooth, there is one small ulcer ; the hard palate looks the same as last night. The eyes and nose are perfectly clean.
„ 12	8 A.M.	58 - -	30 - -	101·4	—	—	94	—	The animal is still purging, but otherwise looks healthy ; it feeds well, and ruminates regularly. The udder is not so painful during milking.
„ „	8 P.M.	62 - -	26 ; standing -	101·6	1154·8	85	—	—	Diarrhœa not so bad. The vulva is a little swollen, but otherwise of a healthy appearance. The mucous membrane of the mouth is about normal.
„ 13	8 A.M.	51 - -	15, expiration hoarse.	103·7	—	—	108	—	Diarrhœa worse to-day.
„ „	8 P.M.	56 - -	24 „	101·3	1489·1	124	—	—	Still purging, but feeding well. The mucous membranes all appear normal ; no discharge.
„ 14	– A.M.	51 - -	40 - -	101·8	—	—	130	—	
„ „	– P.M.	56 - -	35 - -	101·9	1722·2	177	—	—	Still purging. The vaginal mucous membrane is a little redder to-night, but no discharge. Mouth, eyes, and nose normal.
„ 15	– A.M.	50 - -	30 - -	101·9	—	—	130	—	Diarrhœa not so bad.
„	8 P.M.	51 - -	30 - -	102·5	—	160	—	—	Mucous membranes as last night.
„ 16	8 A.M.	52 - -	26 - -	101·8	—	—	134	—	
„ „	8 P.M.	58 - -	33 ; standing -	102·2	—	154	—	—	Mucous membranes healthy.
„ 17	8 A.M.	54 - -	28 - -	101·8	—	—	140	—	
„ „	8 P.M.	48 - -	20 - -	101·7	—	—	—	—	
„ 18	8 P.M.	50 - -	36 - -	102·0	—	—	130	—	
„ 20	8 P.M.	65 - -	32 ; standing -	101·8	—	—	—	—	
„ 22	8 P.M.	52 - -	28 - -	101·4	—	—	—	—	

CASE No. 7.—A yearling heifer, placed in the same stable with the animals recovering from Cattle Plague (Nos. 1, 2, 4, and 6), on the 27th December.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Urine in 24 hours. Quantity of Urine.	Urine in 24 hours. Sp. gr.	Remarks.
1865.					Fluid oz.		
Dec. 27	8 0 A.M.	72; standing -	48 - -	102·4	- -	- -	Diarrhœa this morning.
„ „	8 0 P.M.	72 „	46; standing -	102·5	90	1045	Fæces less fluid to night.
„ 28	8 0 A.M.	66 „	37; standing, and feeding.	102·6	- -	- -	The diarrhœa has ceased.
„ „	8 0 P.M.	68 - -	54; ruminating	103·1	50	1048	
„ 29	8 0 A.M.	66; standing -	31; standing -	101·2			
„ „	8 0 P.M.	74 „	67; standing, and ruminating.	101·6	55½	1048	
„ 30	8 0 A.M.	72 - -	47; ruminating.				
„ „	8 0 P.M.	62 „	27, with a pause when chest full.	101·8			
„ 31	8 0 P.M.	67; standing -	61; standing -	101·8	190	1021	
1866.							
Jan. 1	8 0 P.M.	65 „	53 - -	102·3	200	1021	
„ 2	8 0 P.M.	87 „	66; standing, and excited.	102·6	98	1041	
„ 3	8 0 P.M.	66 „	37; standing -	102·5	70	1045	
„ 4	8 0 P.M.	72 „	68 „	102·5	73½	1035	
„ 5	8 0 P.M.	70 „	72 - -	102·0	120	1026	
„ 6	8 0 P.M.	72 „	36 - -	103·2	215½?	1016?	
7	8 0 A.M.	68 - -	38 - -	103·2			
„	8 0 P.M.	80; standing, and ruminating.	61 - -	102·8	58	1043	
„ 8	8 0 A.M.	- - -	- - -	102·0			
„ „	8 0 P.M.	76 - -	60 - -	102·0	78	1045	
„ 9	8 0 P.M.	80; standing -	38 - -	101·9	74	1052	
„ 10	8 0 P.M.	78 - -	38; ruminating	102·8	142	1035	
„ 11	8 0 P.M.	84 - -	38 „	105·7	155	1028	The visible mucous membranes on examination this evening are all found healthy, and of a uniform pale pink colour.
„ 12	8 0 A.M.	72 - -	36 - -	- -	- -	- -	The animal has left a good deal of the hay given last night.
„ „	8 0 P.M.	82 - -	42 - -	105·8	76	1046	The surface of the vagina is still smooth, but a little redder than last night; no discharge. The mucous membrane of the mouth is smooth and clean, but seems of a deeper pink colour than last night. The animal has been feeding as much as usual to day.
„ 13	11 0 A.M.	80, thready -	62, with a catch	105·2	—	—	
„ „	— P.M.	77 „ -	46; standing; the respiratory movements quite normal whilst standing, but in the lying posture the breathing assumes the same character as in the other affected animals.	105·8	57½	1045	The colour of the vaginal mucous membrane is the same as last night, but a few very small elevated specks are now seen. The skin below the vulva is rough dry and scaly. The mucous membrane of the lower lip below the right corner tooth is beset with small white elevated specks; the tongue is clean; the papillæ blushed. Has not been feeding to day, but was observed ruminating to night. The fæces are harder.
„ 14	— A.M.	70 - -	44 - -	106·3	—	—	
„ „	— P.M.	72, variable in frequency, and exceedingly weak.	38 - -	106·8	41	1038	The visible mucous surfaces appear much the same as last night; the white elevations on the lower lip are a little larger.
„ 15	8 0 A.M.	74, very weak -	40 - -	106·3	—	—	Is feeding badly. Constipation.
„	8 0 P.M.	94 - -	37 - -	106·4	78	1037	To night the vagina looks pale, and is smeared with creamy discharge. On the lower lip the patches below the corner tooth have increased in extent and exhibit denuded fissures in the centre; the papillæ near the angle of the mouth are tipped with red, and are coated at the base with white aphthous deposit; the tongue as before.
„ 16	8 0 A.M.	86 - -	46 - -	105·8	—	—	This morning the animal is purging; still not feeding.
„ „	8 0 P.M.	76, very weak -	30, with an occasional catch.	101·8	23	1020	Diarrhœa much increased; fæces light-coloured and offensive. The mucous membrane of the vagina is of a deeper hue to night, and is moist and smooth. The surface of the lower lip is now covered with a continuous aphthous eruption except in the hollow below the gum, where it remains clean; in the hollows between the fangs of the incisor teeth there are well-marked aphthous patches. The under surface of the tongue along the margins presents a patchy appearance. The discharge from the nose is becoming crusted around the margin of the nostril; the tears are running down the right cheek.
„ 17	— A.M.	Found dead this morning.*					

* The animal was dissected on the following afternoon, with the kind assistance of Dr. Fenwick. My notes show that the usual alterations were met with in all the organs. Decomposition was much advanced. On the deeply-stained inner surface of the right ventricle, numerous minute bubbles of gas were seen beneath the lining membrane. The skin of the udder was beset with soft papular elevations.

CASE No. 8.—A yearling heifer, placed in a stall where one of the inoculated animals had recovered from Cattle Plague, on the 26th of December.*

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1865.					
Dec. 27	8 0 A.M.	72; standing -	36; standing -	102·3	
„ „	8 0 P.M.	72 „	40 „	102·0	
„ 28	8 0 A.M.	74 „	32; standing, and feeding.	101·9	
„ „	8 0 P.M.	72 „	58; standing -	102·4	
„ 29	8 0 A.M.	64 „	20; standing, and ruminating.	101·8	
„ „	8 0 P.M.	68 - -	65 - -	101·8	
„ 30	8 0 P.M.	80; standing -	63; standing -	102·2	
„ 31	8 0 P.M.	77 „	62 „		
1866.					
Jan. 1	8 0 P.M.	62 „	39 „	101·4	
„ 2	8 0 P.M.	66 „	54; standing, and ruminating.	102·2	
„ 3	8 0 P.M.	80 „	54; standing, and eating.	102·8	
„ 4	8 0 P.M.	72 „	78; standing -	102·6	
„ 5	8 0 P.M.	76 „	68 „	104·0	
„ 6	8 0 A.M.	72 „	38 to 40 -	104·2	
„ „	— P.M.	74 „	30 - -	106·3	
„ 7	— A.M.	72, artery feels smaller.	25 - -	106·3	
„ „	8 0 P.M.	68 - -	60; standing -	106·4	The mucous membrane of the mouth is found to be slightly reddened to night, especially on the lower lip. The vagina is redder than last night, and appears somewhat injected. The eyes and nose are clean.
„ 8	8 0 A.M.	78; standing -	60 „	106·0	
„ „	8 0 P.M.	76 - -	- - -	106·4	The mouth is of a deeper hue than last night. On each side below the corner tooth there are some well-marked aphthous patches (in the hollow where the mucous membrane is reflected from the gum on to the lower lip). On the right side there is one elongated patch with a longitudinal crack in its centre, surrounded by an irregular white elevation, but there is no distinct abrasion; surrounding this elongated patch are two or three smaller white elevations; on the gum below the right corner tooth there is also a row of three small white elevated specks, of which the one in the centre is the largest, the other two being about the size of pins' heads; on the left side are observed three distinct white patches, each about the size of a millet seed; and there are some smaller specks surrounding these; there is no distinct areola round any of the patches; the upper lip and gum appear perfectly clean; the papillæ are reddened but still of a uniform colour. The vagina looks much the same as last night, but the mucous membrane seems a little more injected around the clitoris.
„ 9	— A.M.	76, unaltered in character.	45; standing -	106·2	The animal looks dull this morning; has not fed since last night; constipation since yesterday; the fæces rather slimy.
„ „	— P.M.	76 - -	38, unaltered in character.	106·4	The patches on the lower lip described last night are larger and more confluent, and are surrounded by numerous small white elevations. The elevations seen last night on the gum at the right side are enlarged and all but confluent, and near them there are a few more small elevations. The colour of the vagina is much the same as last night, but the mucous membrane is now rough, and is studded with numbers of very minute specks, which are of a pale colour, but not opaque.
„ 10	8 0 A.M.	76 - -	23 - -	105·4	The respiration is changed in character; every now and then there occurs a pause between inspiration and expiration, and the same noise is then heard as in other animals, but in this animal there is the peculiarity that the pause is not observed regularly; for several seconds the breathing is normal, and then for a few seconds each respiration ia accompanied with the pause and grunt. Constipation still marked; not feeding well, but eating a little.
„	8 0 P.M.	84, weak and thready.	38, the pause between inspiration and expiration occurs more constantly.	106·6	The animal began to purge this afternoon; the fæces are now very liquid, dark coloured, and fœtid; is eating very little, and shivers occasionally. The eruption on the lower lip is considerably extended to-night, and forms a chain of patches which have fissure-like abrasions in their centres. The under surface of the tongue is beset at its margin with white patches, and the fungiform papillæ on the margin of the tongue near the tip are enlarged, red, and bare. The mucus membrane of the vagina appears much as last night, but is now covered with sticky mucus; the skin below the vulva feels greasy, but seems otherwise healthy. At the inner side of the left thigh are two solid tubercles, not perceptibly reddened, and evidently painless.
„ 11	8 0 A.M.	96, weak and thready.	27, much noise in expiration; the click of the glottis closing at the end of inspiration is distinctly audible, as well as the groan at the end of the pause.	105·4	
„ 11	8 0 P.M.	96 - -	34; standing; the same character of breathing is observed, and the expiratory noise is louder.	103·7	The mucous membrane of the mouth is as last night; the margins of the lips near the angles of the mouth are rough, the epithelium being elevated, and scaling off; some of the papillæ on the cheek appear denuded at the apex, but are covered with a whitish crust at the base; the discharge from the nose is more abundant and is crusting round the nostrils; the eyes are watery; and the lachrymal secretion running down the cheek; the vagina is smeared with a very tenacious discharge; the nodules inside the thigh in the same state as described last night.

* *See* Dr. Bristowe's Report, No. 34.

Dr. Sanderson.

Report to Commissioners.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Jan. 12	8 0 A.M.	100, weak	38; standing	102°·9	Fæces very liquid, light coloured, and hig offensive. Has eaten nothing since last nig
„ „	Afternoon	- - -	- - -	102·8	
„ „	Evening	98, almost imperceptible in the facial artery.	38; standing	102·6	The condition of the lower lip continues same; the aphthous patches on the lower sur of the tongue have increased in extent; discharge from the eyes and nose is much as night; the vaginal discharge is more liquid. It was observed on taking the perature in the afternoon that the animal's head was turned round to the right This is still the case, and is found to be due to tonic contraction of the muscles of neck. At 10 P.M. the creature was lying stretched out and evidently dying.
„ 13	Died this morning.				

Case No. 9.—A yearling heifer, brought in on the 26th of December, and placed in a stable adjoining to that occupied by Nos. 7 and 8.*

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1865.				°	
Dec. 27	8 0 P.M.	78 - -	31; ruminating.	102·8	
„ 28	8 0 A.M.	72; standing -	44; standing and eating.	102·4	
„ „	8 0 P.M.	52 „	43; standing -	102·6	
„ 29	8 0 A.M.	78 „	50 „	102·0	
„ „	8 0 P.M.	69 - -	60; ruminating.	103·0	Diarrhœa.
„ 30	8 0 P.M.	74; standing -	40; standing -	102·2	
„ 31	8 0 P.M.	72 - -	56 - -	- -	Is still purging, but otherwise healthy.
1866.					The diarrhœa has ceased.
Jan. 1	8 0 P.M.	62; standing -	23; standing and eating.	101·7	
„ 2	8 0 P.M.	83 „	46 „	102·8	
„ 3	8 0 P.M.	74; ruminating	52; ruminating.	103·2	
„ 4	8 0 P.M.	86; standing -	45; standing -	102·8	
„ 5	8 0 P.M.	70 „	50; standing and ruminating.	102·0	
„ 6	- -	80 - -	36; ruminating	102·3	
„ 7	- -	84 - -	46; standing -	104·2	
„ 8	8 0 A.M.	90; standing -	48 „	105·2	
„ „	8 0 P.M.	90 „	48 „	105·5	The visible mucous membranes are healthy of a uniform pale pink colour.
„ 9	— A.M.	84 „	40; standing, restless.	105·2	
„ „	8 0 P.M.	96 „	53; standing, and eating.	105·5	The vagina looks a little redder than last ni The eyes and nose clean; on the lower opposite the corner tooth at each side there is a distinct dent patch with irregular elevated white margins.
„ 10	8 0 A.M.	96 „	42; standing, excited.	105·2	Constipation; fæces hard.
„ „	8 0 P.M.	92 „	40; standing -	105·2	Fæces hard and slimy. The vagina is n reddened and the surface dotted with small elevations more or less translucent. On the skin inside the thighs there are several hard nodules ur the skin. The mucous membrane of the mouth appears much the same as last night; the dent patches are very slightly if at all extended.
„ 11	8 0 A.M.	84 - -	36 - -	105·2	
„ „	8 0 P.M.	82, thready; metacarpal artery feels very hard and small.	35; standing, unaltered in character.	105·7	Diarrhœa commenced to night; the animal eating, but not feeding so well as usual; l and ears very cold. The mucous membrane the vagina exhibits on the right side three d tinct bright red patches, and on the left side th is one distinct red patch of the same kind; the surface is smeared with very tenacious mucus. On the lower lip patches opposite the corner teeth at each side have extended; in the centre of the patch on the right side there is irregularly abraded surface where the epithelium has been stripped off, but the colour of this surface is not so deep that observed in the abrasions in other animals. (On the upper lip there were previously observed two patches ulceration which are now quite healed up; these were evidently accidental, and had none of the characteris appearances of the eruption). Some of the papillæ at the lower part of the cheek are tipped with red; oth slightly blushed. At the inner canthus of the eye there is a little tenacious discharge, but no tears running do the cheek. A slight discharge comes from the nose.
„ 12	8 0 A.M.	94; standing; slightly altered in character, but as yet there is no distinct expiratory noise.	- - -	- - -	Diarrhœa worse and fæces fœtid; has eaten v little since last night.
„ „	8 0 P.M.	86 - -	24, quite altered; now of the same character as observed in the other animals.	102.5	Fæces very liquid and fœtid; is taking very li food. The surface of the vagina is found to b a paler hue, except on the right side where there is a distinct stripe in the part where the red patches were observed last nig The lower lip looks much the same as last night; the denudati have spread very little. The margin of the lips near the angle of mouth are rough and covered with a crust of the usual charact Some of the papillæ are becoming red and denuded.
„ 13	11 0 A.M.	85, very small and weak.	24, with prolonged rattling moan.	100·8	
„ „	3 0 P.M.	- - -	38, oppressed and moaning.	99·2	
„ „	—	Died soon after the last observation.			

* *See* Dr. Bristowe's Report, No. 35.

CASE No. 10.—A heifer brought in on December 8th already affected with the disease, probably at the 4th day.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Remarks.
1866. Jan. 8	8 0 P.M.	88; counted in the brachial artery; thready, and could not be counted in the metacarpal or metatarsal arteries; the metacarpal artery felt very small and hard like a piece of cord under the finger.	36; standing; of the character commonly observed in animals affected with the cattle plague; a pause when the chest is full, accompanied with the usual grunting noise; movements of the chest as described in other cases.	- - -	The animal looks very dull and is not feeding; diarrhœa; discharge from eyes and nose. Thorax very resonant. On examination of the vagina it is found intensely red, and the surface looks as if denuded of epithelium; it is covered with a white thick tenacious discharge, which gives the mucous membrane a peculiar mottled or patchy appearance. The skin below the vulva exhibits an eruption extending downwards for several inches. This is of the same character as observed on the skin below the anus in the bullock, Case No. 3; the seat of the eruption is very moist, and feels greasy, as if it had been smeared with oil. The eyes are sunken and watery; the conjunctivæ injected, of a deep red colour. The mucous membrane of the upper gum, and the whole of the lower lip, is covered with an aphthous eruption; the surface of the membrane is elevated and rough; the epithelium presents a sodden appearance, and can be readily detached from some of the more elevated patches.
„ 9	8 0 A.M.	90; counted at the brachial artery.	40; standing; of the same character as last night; the pauses between inspiration and expiration vary in length.	103·6	This morning, while the respiration was being counted, there were observed two pauses of about three seconds each, during which a distinct shiver occurred. This shiver was noticed again at irregular intervals during the next five minutes. Eyes watery and half closed.
„ „	8 0 P.M.	92, still thready -	36, of the same character.	- - -	The vagina continues excessively red, and between its opposite sides there are numerous flakes of a semi-solid whitish material. The eruption on the skin below the vulva is drier, and is getting crusted. On the skin of the neck furfuraceous scurf is observed; it is most marked on the left side, in front of the shoulder; the skin here feels thickened and knotty, with some well marked vertical grooves. The eyes are very red; the discharge from them is less watery, with a greater tendency to become crusted at the inner canthus. The secretion from the nose is more abundant and more viscid. The upper gum is covered with aphthous eruption, as described last night, but the epithelium seems more elevated and more easily detached; the lower lip is also still covered with it. The eruption is more elevated in some parts, and is readily detached, but there are very few abrasions. The muzzle is dry, and the epithelium cracked, with a tendency to scale off. On the upper lip there are numerous hard nodules at the roots of the large hairs; some indistinct nodules of the same character are also found on the lower lip. The papillæ inside the cheek are spotted and patchy, the epithelium being detached, and leaving the membrane of a bright red colour. The animal is very dull, and not feeding; the eyes half closed; fæces very fluid and fœtid.
„ 10	8 0 A.M.	103 - -	32 - -	102·2	Fæces still fluid and fœtid, light coloured. The animal shivers occasionally.
„ „	8 0 P.M.	95; standing -	32; standing; character remains the same.	102·2	The vagina is found in much the same condition as last night, but several small red specks are seen on the right side, near the clitoris, and one small red speck on the right side. The skin eruption below the vulva is dried up and cracking. The skin of the neck same as last night. The eyes are discharging very freely; the discharge is tenacious and runs down the cheeks, matting the hair. The epithelium is peeling off the dental pad in white flakes. This change in the condition of the epithelium extends back to the second ridge of the palate. Beyond this there is no appearance of any change in the epithelium, but on the palate there are several distinct red spots. The lower lip is now healed, and is assuming its natural appearance. The animal shivers when touched.
„ 11	8 0 A.M.	96 - - -	36; standing; of the same character, but accompanied with less noise.	102·6	Still purging, but looks on the whole a little better this morning.
„ „	8 0 P.M.	84 - - -	30; respiratory movements of the same character, but accompanied with less noise.	102·9	The animal looks much better to-day, and is beginning to eat a little. Diarrhœa continues, but the fæces are less fœtid and more natural in colour. Coldness of extremities less marked. Thorax still very resonant. On inspection of the vagina it is found all but healthy, the surface being a little redder than natural, but now smooth, and the discharge scarcely visible. Below the vulva the skin is quite dry and scaly. The skin of the neck continues as before. The discharge from the eyes is still abundant and runs down the cheeks, but is more watery and less tenacious. The spots on the dental pad from which the epithelium was peeling off last night are now healed up and quite smooth, the only visible trace of the eruption is a little redness. The mucous membrane of the lower lip is healthy, as also the upper gum. Along the margins of the lips there are numerous crusts where the small elevations were previously observed. The muzzle is cracked and bleeding a little, but looks as if it were healing. The appearance of the papillæ is almost natural.
„ 12	8 0 A.M.	84 - - -	36; standing and eating; still of the same character but with less noise; a few normal respirations observed occasionally.	—	Looks better to-day.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Jan. 12	8 0 P.M.	72; stronger -	33, normal -	103°0	Animal much livelier and feeding better. Diarrhœa continues, but fæces darker coloure. Mucous membranes healthy; discharge from eyes and nose decreased and less tenacious; muzzle healing. Skin below vulva and on the neck much the same as last night.
„ 13	11 0 A.M.	78 - - -	32; normal; animal tranquil.	103·8	
„ „	— P.M.	84, stronger and not so thready.	26; lying tranquil.	105·0	Purging less; feeding pretty well and ruminating.

Case No. 11.—A heifer, spotted black and white, brought in from Notting Hill on the 9th of January. It had been standing in the same stable as Case No. 4, but had shown no symptoms of the disease. It was inoculated immediately after admission.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1866. Jan. 9	8 0 P.M.	72 - -	25; ruminating	103°1	Inoculation performed this evening with lymph collected from the eyes of Case No. 4; the punctures were made near the vulva.
„ 10	8 0 P.M.	84; standing -	44; standing -	104·7	
„ 11	8 0 A.M.	72 „ -	24 „ -	102·4	
„ „	8 0 P.M.	64 „ -	48 - -	104·3	Mucous membranes normal; animal is still feeding well, and looks healthy.
„ 12	8 0 A.M.	72 „ -	40; standing -	—	
„ „	8 0 P.M.	72 - -	44 - -	106·0	Mucous membranes still natural.
„ 13	11 0 A.M.	60 - -	46; standing -	106·4	On examination in the evening the mucous membrane of the vagina was found redder than natural, and speckled with small white elevations; slight creamy discharge. The skin below the vulva exhibited at intervals conical elevated crusts; on removing any of these crusts the hairs to which it adheres are drawn out and the skin is left bare and moist, of a pink colour. The lower lip is beset with isolated aphthous patches, varying in size from $\frac{1}{40}$ths to $\frac{2}{5}$ths of an inch in diameter; these patches are elevated above the surface more than usual.
„ 14	8 0 A.M.	72 - -	54 „ -	106·4	Fæces hard.
„ „	8 0 P.M.	72, weak -	28, with a catch in expiration.	106·4	The animal was bled this morning, and about eight ounces of blood taken. The mucous membranes present the same appearances as last night, except on the lower lip, where the patches have become larger, and a very few of them are confluent.
„ 15	— A.M.	84, weak -	38; altered in character; the expiratory noise and the movements of the chest are well marked.	105·8	Is not feeding.
„ „	8 0 P.M.	80 - -	37; standing -	105·0	Diarrhœa observed to night. The aphthous patches on the lower lip are still extending, and the coating upon the surface is more elevated; the whole mucous membrane of the mouth is dotted with white elevations. The under surface of the tongue, and the roots of the papillæ are covered with a thick coat of curdy looking substance. The vaginal mucous membrane is red, dry, and smeared with sticky mucus.
„ 16	8 0 A.M.	84 - -	38, of the same character, with loud expiratory noise.	104·2	This animal was to-day given into the charge of Dr. Richardson for therapeutical experiments. Death occurred at 9 P.M.*

* The dissection was performed on the following day, with the assistance of Mr. Duguid. The morbid appearances did not differ materially from those usually observed.

Case No. 12.—A white yearling heifer, brought from Notting Hill on the 9th of January. It had been standing for several days in the same stable as No. 4, but appeared healthy up to the time that it was put under observation. It was inoculated on the night of admission.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Urine in 24 hours. Quantity of Urine.	Urine in 24 hours. Sp. gr.	Remarks.
1866.				°	Fluid oz.		
Jan. 9	8 0 P.M.	84 ; standing		101·0	—	—	Inoculation performed to-night by punctures on either side of the vulva and below it ; the lymph used was taken from the eyes of No. 4.
10	8 0 P.M.	70 „	18 ; standing	102·6	—	—	The fæces are very hard and dry and are passed in pellets.
11	8 0 A.M.	60 „	22 „	—	—	—	
„	8 0 P.M.	72	34	103·8	—	—	The animal was to night put on lead covered stall so as to collect the urine for examination. The mucous membranes are found healthy.
12	8 0 A.M.	72	46 ; ruminating	—	—	—	
„	8 0 P.M.	62	36	105·6	35	1045	Fæces dry and hard. Mucous membranes still healthy, but look rather deeper in colour to-night.
13	11 0 A.M.	60, soft and compressible.	48	106·6	—	—	
„	— P.M.	56	46, normal	106·0	132½	1024	The lower gum is slightly reddened On the lower lip there are aphthous patches below both corner teeth ; the one on the right side extends from the surface of the gum behind the right corner tooth to the free margin of the lip ; between these there are numerous small isolated white elevated patches of various sizes, the largest about ⅛th of an inch in diameter. On the chin here and there small white elevations are seen surrounding the large hairs. The vagina is rose-coloured, rough, and smeared with mucus.
14	— A.M.	54	64 ; standing	106·8	—	—	
„	— P.M.	50	72 ; seems very uncomfortable.	106·1	50	1029	Mucous membrane in much the same condition as last night.
15	— A.M.	57	68	106·0	—	—	Constipation. Animal feeds very badly.
„	8 0 P.M.	42	61 ; standing	104·3	50	1025	Between the patches below the corner teeth several new patches have appeared, each denuded in the centre. The whole mucous membrane looks opaque and is dotted with white elevations. The under surface of the tongue is coated along both margins. The vagina is as before described.
16	— A.M.	68, very weak	18, with catch in expiration, but breathing occasionally rapid in the intervals.	103·2	—	—	
„	8 0 P.M.	68	21 ; standing. Respiration characteristic of the disease.	103·2	50	1028	Diarrhœa to night. Discharge from eyes and nose crusting at the inner canthi of the eyes and around the nostrils. The lower lip is now completely covered by the aphthous eruption which extends along the border of the lips to the angle of the mouth ; on the upper lip on the left side close to the angle of the mouth there is a crust of the same kind as described in some of the other cases ; the upper lip is dotted with small elevations. The papillæ are thickly coated, some of them denuded at the apex ; the under surface of the tongue is patchy. The vagina exhibits some bright red denuded spots near the clitoris, which is also of a very bright red colour ; a creamy tenacious discharge from the vagina.
17	— A.M.	90	18 ; standing	102·2	—	—	Has eaten nothing since yesterday morning ; diarrhœa continues ; fæces fœtid, passed in very small quantity, as light coloured as the evacuations of a sucking calf and tinged with blood.
„	8 0 P.M.	100	18 ; standing ; of the same character as above described.	103·6	36	—	Mucous membranes in the same condition as last night. The vagina is more thickly coated with discharge, and the secretion is more flaky.
18	Found dead in the stall this morning.*						

* The dissection was performed by Mr. Law on the same day. The usual appearances were observed.

Dr. Sanderson.

Report to Commissioners.

CASE No. 13.—A red and white heifer, 9 months old; brought from Tottenham on the 16th of January 1866. The animal was healthy, but in poor condition; the skin of the neck was partly covered with a scurfy crust.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
Jan. 15	9 0 P.M.	- - -	- - -	- - -	The animal was inoculated by subcutaneous injection of two drachms of serum of blood taken at 9 A.M. on the previous day, from No. 11.
„ 19	9 0 P.M.	80 - -	33 - -	103·5	
„ 20	9 0 A.M.	72 - -	20; standing and ruminating.	- - -	
„ „	9 0 P.M.	76 - -	34; standing and feeding.	102·8	
„ 21	9 0 A.M.	72 - -	24; standing -	102·8	
„ „	9 0 P.M.	72 - -	30; „ -	102·5	Inoculation repeated with mucous discharge from the eyes of No. 12, diluted with five times its volume of milk.
„ 22	9 0 A.M.	74 - -	42 - -	103·2	
„ „	9 0 P.M.	- - -	- - -	104·6	The visible mucous membranes are of a uniformly pale pink colour. There is no discharge from eyes or nose.
„ 23	9 0 A.M.	72 - -	40 - -	104·2	
„ „	9 0 P.M.	78 - -	50 - -	105·2	The pink colour of the mucous membrane of the mouth seems a little deeper than usual, particularly around the papillæ. The upper lip is perfectly clean and smooth, except in the situation of one or two old scars. On the lower lip nearly opposite the corner teeth, on both sides, there are clusters of small white elevated specks, about the size of pin-heads. The vagina is of a deeper colour, and dotted with small elevated specks; there is a slight discharge.
„ 24	9 0 A.M.	84 - -	28 - -	105·0	
„ „	9 0 P.M.	84 - -	39 - -	105·8	The eruption on the lower lip is extending; some of the specks observed last night are now confluent, and there are several fresh spots here and there on the surface of the lip. There is a discharge from the nose, and the eyes are watery. The vagina is paler, but the discharge is more abundant. The animal eats little.
„ 25	9 0 A.M.	86 - -	30 - -	105·6	The animal does not feed, and coughs occasionally; the cough is husky.
„ „	9 0 P.M.	76 - -	40, natural -	106·6	Diarrhœa. The animal does not feed. The upper lip is nearly clean. The lower lip is coated with a continuous but fissured aphthous crust; the under surface of the tongue presents a similar appearance. The vagina looks much the same as last night, but there is no eruption to be seen. Below the vulva and extending down between the thighs the skin is a little scurfy, and somewhat greasy to the touch.
„ 26	9 0 A.M.	78 - -	36; standing -	106·0	
„ „	9 0 P.M.	84; weaker and thready -	36, unnatural and interrupted.	105·6	Mucous membranes in the same condition as last night. The animal took readily some barley meal gruel, and seems livelier. Diarrhœa continues, and there are occasional muscular twitchings.
„ 27	9 0 A.M.	120 - -	24; standing (much more labored than last night; expiration very difficult)	101·0	The animal is apparently worse, the discharge from the mouth and from the nose is increased. The eyes look sunken and half closed, the tears running down the cheeks, and crusts are forming at the inner canthus.*

* The animal died soon after two o'clock the same afternoon; the temperature a few minutes before death, was 100·4.

Case No. 14.—A heifer, aged 9 months; bought of Mr. F. Crook on the 21st of January. The animal was vaccinated by him a month before and yielded lymph for the successful vaccination of two children. From these other children have since been vaccinated.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
66					
. 22	9 0 P.M.	- - -	24; standing -	103·2	The animal was inoculated with liquid discharge from the eyes of No. 12, by subcutaneous injection near the vulva. The liquid had been preserved since the 16th of January in capillary tubes.
23	9 0 A.M.	78 - -	34; standing -	102·8	
„	„ P.M.	72 - -	40; standing -	102·6	
24	„ A.M.	72 - -	28; standing -	103·2	
„	„ P.M.	70 - -	44; standing -	102·8	
25	„ A.M.	72 - -	26 - -	103·2	
„	„ P.M.	82 - -	36; standing and ruminating.	102·8	The inoculation was repeated by a seton in the neck, with lymph taken from the eyes and nose of No. 13.
26	8 0 A.M.	78 - -	34 - -	105·0	
„	„ P.M.	84 - -	70; standing -	105·6	The animal feeds irregularly and appears excited.
27	9 0 A.M.	76 - -	43 - -	105·5	Still feeding; fæces natural.
„	„ A.M.	78 - -	43 - -	106·2	Mucous membranes perfectly healthy.
28	„ P.M.	68 - -	48, tranquil -	106·2	Has not fed since last night; fæces slimy and harder than natural,
„	„ P.M.	74 - -	48; standing and eating.	106·2	Has fed better than yesterday; there is a small roughened spot on the right side of the lower lip as if the mucous membrane had been nibbled. On the lower lip one or two small elevated white specks are observed. The upper gum is perfectly clean, pale, and smooth. The mucous membrane of the vagina is deeper in colour than last night and somewhat injected; it also exhibits several small white elevations.
29	„ A.M.	60 - -	45 - -	105·6	Has eaten very little since yesterday; constipation continues.
„	„ P.M.	62 - -	60 - -	106·2	The mucous membrane of the mouth is a little redder; the rough spot on the right side of the lower lip has enlarged, on the left side there is now a distinct aphthous patch and several small white specks here and there on the gum. The vagina is more injected and the surface is covered with creamy discharge.
30	„ A.M.	64 - -	47 - -	106·2	
„	„ P.M.	64 -	53 - -	106·4	Feeds badly; constipation continues.
31	„ A.M.	68; weaker -	46 - -	105·3	
„	„ P.M.	66; weak and thready.	35, interrupted	105·8	The urine is very high coloured and albuminous; the the animal eats little, but drinks freely; fæces still hard. The upper gum is now covered with a continuous aphthous eruption which is most abundant near some previously existing scars on the mucous membrane. The whole of the lower lip and lower gum is covered with eruption, and the epithelium is becoming detached. The papillæ on the cheeks are blushed, and one or two of those near the angle of the mouth are denuded at the tips. The palate looks patchy. The inner canthus of the eye and the muzzle are incrusted with discharge. The surface of the vagina is of a deep red colour, and studded with white patches, and the epithelium peeling off. The discharge is not so abundant as last night.
1	„ A.M.	68 - -	29 - -	105·0	The animal does not feed and has begun to scour; the
„	„ P.M.	69; weak -	29 - -	104·8	introduction of the thermometer into the rectum is resisted. The lips present much the same appearance as last night, but the aphthous coating seems a little thicker; on the margin of the upper lip near the right corner of the mouth, there are two distinct brownish coloured crusts. The papillæ of the cheek are more denuded and the palate is more patchy. There are a few aphthous spots on the under surface of the tongue.
2	„ A.M.	70 - -	26 - -	101·9	Diarrhœa continues; fæces light coloured and very offensive.
„	„ P.M.	74 - -	19 - -	101·5	To-night the aphthous coating on the lips is peeling off, leaving the mucous membrane smooth; the papillæ and tongue are as last night. The discharge from the eyes and nose is still very abundant and tenacious. The vagina is of a paler hue, and there is very little discharge; the mucous membrane is smooth and only one or two of the white flakes are to be seen.
·3	„ A.M.	84; standing -	20 - -	101·2	The animal looks better and seems inclined to feed.
„	„ P.M.	70 - -	35; eating -	102·0	Diarrhœa continues; fæces extremely fœtid. Mucous membranes are a little rough but of a pale pink colour and almost healthy. Less discharge from eyes and nose.
4	„ A.M.	69; very irregular.	63 - -	103·0	Is feeding better and looks livelier. The breathing is usually slow and interrupted, but becomes at intervals natural, though very rapid.
„	„ P.M.	72 - -	35; still - -	102·8	Mucous membranes healthy. The breathing is still occasionally interrupted, but not noisy.

Dr. Sanderson. Report to Commissioners.

CASE No. 15.—A cow, 2 years old, in calf, presented to the Royal Commissioners on the 1st of February, for the purp of experiment, by James Dumbrell, Esq., of Ditcheling, Hurstpierpoint. The animal had been vaccinated on 12th of January by Mr. Holman, of Hurstpierpoint, and exhibited three characteristic vaccine crusts on the side of the vulva.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Remarks.
1866.				°	
Feb. 1	- -	- - -	- - -	- - -	At 8 p.m. the animal was inoculated by subcutane injection in the perinæum with mucous discharge fr the eyes of No. 14.
„ 2	2 0 P.M.	70 - - -	48 ; standing -	101·8	
„ 3	„	72 - - -	30 ; „ -	101·8	
„ 4	„	88 - - -	50 ; - -	103·4	Feeding well, and apparently healthy.
„ 5	„	90 - - -	42 ; standing -	105·0	Was bled this morning ; about 8 oz. of blood were tak
„ 6	„	84 - - -	51 ; „ -	106·2	The animal appears dull, and feeds badly. T mucous membrane of the lower lip presents seve clusters of small elevations, of a yellowish wh colour. The surface of the vagina is injected a rough, and on the left side a patch can distinguished.
„ 7	„	90 - - -	60 ; standing -	105·8	The animal does not feed, and occasionally shive There are well-marked muscular twitchings wher is touched unawares. The patches in the lower have increased in number and extent ; inside t cheek the papillæ are covered with a thick wh eruption at the base, and a few of them are abrad at the tips. The vaginal mucous membrane is roug red, and injected, and smeared with creamy dischar
„ 8	„	87 - - -	63 ; „ -	105·4	Not feeding ; diarrhœa ; almost constant twitching the gluteal muscles. The eruption in the mouth extending. The discharge from the vagina is mo abundant and tenacious.
„ 9	„	90 - - -	88 ; „ -	103·8	Feeds sparingly ; diarrhœa diminished. The und lip is covered with a continuous rough white coatin but there are no distinct abrasions ; the upper lip studded with small elevations ; papillæ as before surface of vagina red and flaky.
„ 10	„	108, slightly weaker.	80 ; „ -	105·6	Diarrhœa increased. The animal does not feed, ar shivers occasionally ; straining every now and the as if about to calve. There is an abundant slimy discharge from the vagina. Th nostrils are incrusted with discharge. Both lips are covered with confluent concretio fissured by cracks the general direction of which is parallel to the edges of the gum Through these cracks the subjacent mucous membrane is seen to be highly injecte The papillæ are becoming more denuded at the tips, but are still covered at the ba with a thick white coating ; the palate and under surface of the tongue have a patch appearance. The chin is covered with a continuous layer of tolerably firm whi material, very similar to the coating on the mucous membrane of the lips, but le friable. The vagina still looks patchy, and discharges tenacious matter. The breathin is occasionally interrupted.
„ 11	11 0 A.M.	- - -	- - - - - -		This morning the animal was very dull and prostrate about 8 a.m. the fœtal membranes ruptured, and a fe labour-pains were observed. At about 11 a.m. the animal was lying with head an legs stretched out (respiration about 80, pulse imperceptible) ; the pains had ceased and the animal seemed sinking fast. On examination the os uteri was found dilated and the feet and head of the calf were readily felt. A mature dead male calf was a once removed without difficulty,* the removal being followed by one or two slight pains After delivery, the cow seemed quite prostrate, and lay stretched out on the left side About 1½ oz. of alcohol was administered in some water, after which the animal rallie a little. [The same dose of alcohol was administered again about two hours after, and the cow was left quiet.]
„ „	3 0 P.M.	88, very weak -	76 ; with an occasional catch in expiration when lying, but not observed while standing.	100·5	The animal seemed very restless during the afternoon lying down, rising, and standing, at intervals of a few minutes. The placenta still retained. The mucous membranes present the following appearances :—The coating on the lips is thicker, but is becoming detached in flakes ; on the upper lip one or two small spots, from which the aphthous coating is detached, look smooth and pale, as if healing ; all the abraded parts on the lower lip are of a bright red colour ; the under surface and margins of the tongue are thickly coated ; the papillæ are still coated at their bases, but abraded and bright red at their tips. There is an abundant discharge from the nose, with which the nostrils are incrusted ; on the margins of the nostrils there are several bright red excoriated patches, and inside the nose a distinct aphthous eruption. While the animal lies, breathing is interrupted and slow ; when she stands, this is not observed, but the breathing is much accelerated.
„ 12	8 0 A.M.	- - -	- - -	- - -	The animal died during the night. [The animal was dissected on the following day. In addition to the ordinary pathological appearances, an abundant eruption was observed on the udder, consisting principally of the usual papular elevations, partly of conical crusts of a darker colour. The preparation has been preserved.]

* The calf was carefully dissected. It was found to be perfectly mature, and free from all trace of disease.

SE No. 16.—A cow, 2 years old, in calf, presented to the Commissioners on the 1st of February by Mr. Dumbrell, having been vaccinated on the 19th of January from No. 15. The animal exhibited four fine vaccine crusts on the left side of the vulva.

ate.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
66 :					
2	2 0 P.M.	72	36	102°4	
3	„	66	20 ; standing, and ruminating.	101·8	
4	„	66 ; standing	42 ; ruminating	102·6	
5	„	72	39 ; standing	102·8	
6	„	70	48 ; standing and ruminating.	105·2	Still feeds well, and exhibits no symptoms of disease.
7	„	72	74 ; standing	106·4	Still feeding. The mucous membrane of the mouth is healthy. The surface of the vagina is injected, but smooth and free from discharge.
8	„	72 ; standing	56	105·8	The animal eats little. Constipation observed for the first time. The lower lip presents several small elevated white patches, in size varying from that of a pin's head to that of a hemp seed. The vagina is red ; but its surface is still smooth ; there is a slight creamy discharge.
9	„	84	53	106·0	Constipation continues, but the animal feeds better. The eruption on the lower lip is extending, and upon the upper lip around the seat of an old cicatrix there are a few well marked white elevations, about the size of pins' heads. The vagina has a patchy appearance; the discharge is more abundant.
10	„	81, very weak	68	102·8	The animal lies constantly, and cannot be made to rise ; it eats scarcely anything. In the afternoon there was diarrhœa. The patches on the lower lip are larger, and their number is increased; on the upper lip there is an aphthous patch about the size of a shilling occupying the seat of the small white elevations observed last night. The vagina still looks patchy, and the discharge is more tenacious.
11	„	Pulsation imperceptible.	18	103·7	The animal seems much worse to-day, and lies on the left side with its limbs extended ; there is diarrhœa, and much mucus is passed with the fæces. The respiration is characteristic of Cattle Plague. The inspiratory pause is followed by a harsh loud groan, the head being at the same time extended forwards. The eruption on the lower lip has increased, so that it extends almost from side to side ; the upper lip is studded with small separate elevations, and the patch on the seat of the old circatrix has enlarged ; the papillæ are coated and are becoming denuded at the tips ; the under surface of the tongue is patchy. The vagina is deeply injected, and exhibits irregular bright red spots where the epithelium is detached ; there is a glairy discharge from the vulva.
12	8 0 A.M.	-	-	-	The animal died during the night.

TE.—On the following day the carcase was carefully dissected by Mr. Duguid, whose notes show that the usual morbid changes present. The appearance of the skin of the udder, which was somewhat unusual, is represented in Fig. 4.

Dr. Sanderson.

Report to Commissioners.

CASE No. 17.—A red bullock, healthy, but in poor condition, was brought from a farm at Tottenham on the 5t February. The skin of the neck was covered with a scurfy incrustation.

Date.	Hour.	Pulse.	Respirations.	Temperature (Fahr.) in Rectum.	Remarks.
1866.				°	
Feb. 6	2 0 P.M.	90; excited	30; standing; very restless.	102·8	About 9 A.M. about half a drachm of serum of bl taken on the previous day from No. 15 was inje into the cellular tissue of the perinæum.
„ 7	„	72; standing	39; ruminating	102·8	The skin of the neck was dressed with sheep-dip.
„ 8	„	80 „	24	102·0	
„ 9	„	90	26; standing	102·2	
„ 10	„	72	24; standing	102·2	
„ 11	„	110; excited	24 „	104·9	
„ 12	„	116; apparently frightened.	44	105·6	The animal does not feed so well as usual. The muc membrane of the mouth is of a pale pink hue; on lower lip there are a few scattered white and eleva specks.
„ 13	„	114	28; standing	105·4	Feeds rather better. The eruption on the lower li slowly extending; the spots have increased in s but not in number. The mucous membrane is stil a pale pink colour.
„ 14	„	91	25 „	105·3	The slow extension of the eruption on the lower lip c tinues; some of the spots first observed have bec confluent, and form white elevated and fissured patc The greater part of the membrane is rough, and app granular; the papillæ are more pink than natural.
„ 15	„	96; standing	19 „	106·0	Constipation. The animal still feeds, but not so as in health. The eruption on the lower lip is gressing, and forms a continuous chain in the hol along the edge of the gum; the gum itself and margin of the lip look healthy; there are sev patches near the corner of the dental pad. papillæ and the palate are pinker than natural, clean. The discharge from the right eye is runn down the cheek.
„ 16	„	96	18; normal, but interrupted when the animal is standing.	104·8	The lower lip now presents a continuous aphth coating; along its border there are three white eleva patches about the third of an inch in diameter, wh involve both the mucous membrane and the skin; surface of the upper lip has an opaque thickened pearance, and here and there there are irregu patches, some of which are denuded in the cent the appearance of the papillæ and palate is unalter There are one or two small patches on the tip of tongue. Both eyes are discharging.
„ 17	„	76	20, interrupted	103·2	Diarrhœa. The animal still feeds, but shivers oc sionally. The eruption on the lower lip has increa in extent, but the mucous membrane appears p where it can be seen through fissures in the concret with which it is coated. The lachrymal secretion more abundant, and the nostrils discharge freely.
„ 18	„	84	22, interrupted occasionally.	102·4	Fæces less fluid; the animal feeds little. The wh coating has peeled off the lower lip, leaving t mucous membrane of a natural pale pink colour; few small patches of the coating remaining; on t upper lip the coating is still thick but its colour very pale, as if the mucous membrane were healing.
„ 19	„	81	24	103·8	Fæces of normal consistency. About 6 ozs. of blo were taken. The mucous membrane of mouth almost clean; a few small spots on the upper l remaining. The discharge from eyes and no continues.
„ 20	„	84	28	102·8	Mucous membrane of mouth healthy.
„ 21	„	78	21; standing	102·0	The animal feeds well, and appears perfectly recovere

Case No. 18.—A small red and white heifer, brought from Tottenham on the 5th of February; it had been successfully vaccinated by Mr. Badcock on the 20th of January.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1866.				°	
Feb. 6	2 P.M.	66	24	102·6	About 9 A.M. the animal was inoculated with serum from No. 15, in the same way as No. 17.
„ 7	„	84; much excited	30; standing	102·6	
„ 8	„	72; standing	16	101·8	
„ 9	„	66	28; standing	102·0	
„ 10	„	69	26 „	103·6	
„ 11	„	72	28 „	103·9	
„ 12	„	66	28; ruminating	105·0	Constipation. On the lower lip there are a few scattered white elevations; no redness around the eruption, and the mucous membrane generally is of a natural pale pink hue. On the muzzle there are six distinct patches of a deeper colour than the surrounding surface; on these patches there are white elevations which look somewhat like vesicles, but probably correspond to the cutaneous glands. On examining the mouth about six hours after, the eruption on the lower lip was found to have increased, and the elevations had become more numerous and larger. The muzzle is moist; the spots on it as before.
„ 13	„	66	30	105·5	The constipation is very marked, and the animal does not feed so well. The eruption on the lower lip has extended with remarkable rapidity, its surface being thickly studded with elevated patches, many of which are almost confluent; on the upper lip there is a complete chain of small aphthous patches. The papillæ and the surface of the mouth are unnaturally pink but quite smooth. The patches on the upper part of the muzzle are as last night, but are a little larger; those on the lower part, near the margin of the lip, are more elevated; they are uniformly white and opaque and have slightly reddened margins. At the outer edge of the right nostril, where the skin is covered with hair, there is a round patch of thickened and elevated cuticle. The surface of the vagina is injected, its mucous membrane being rough and studded with small elevations; there is a slight creamy discharge.
„ 14	„	66	30	105·0	The animal shivers. Both lips are covered with concretion, in which are numerous fissures revealing the bright red mucous membrane beneath. The papillæ are coated, and the palate and under surface of the tongue have a patchy appearance. At the upper part of the muzzle the spots are elevated, hard, and of a deeper colour than the surrounding skin; those at the lower part near the margin of the lip have extended; they are white in colour, and on superficial observation look like vesicles, but by scraping, a mass of soft thickened epithelium is detached from the subjacent bright red cutis. Several new patches have appeared at the margin of the right nostril. The eyes and nose discharge freely. The vagina is very red and the surface covered with tenacious mucus.
„ 15	„	60	46; standing	104·0	The fæces are softer, being of almost natural consistence; the animal eats little, and still shivers at intervals. The lips are still covered with thick white fissured concretion. The patches on the lower part of the muzzle are extending, while those first formed are dry, cracked, and bleeding.
„ 16	„	56	54; standing	98·5	Diarrhœa. The lips have the same appearance as last night, except that on the lower lip at the necks of the incisor teeth there are some spots of almost healthy looking membrane. The papillæ are pale and thickly coated at the bases; the palate is covered with white concretion, but the tongue is very slightly affected. The patches on the muzzle have assumed the appearance of bright denuded spots partly covered with concretion; these spots, however, are all of the same level as the surrounding membrane, being neither elevated nor depressed. The discharge from the eyes and nose is very abundant.
„ 17	„	-	-	-	Found dead in the stall this morning.

Dr. Sanderson.

Report to Commissioners.

Case No. 19.—A red heifer, brought from Tottenham on the 15th of February.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1866.				°	
Feb. 6	2 P.M.	72	30; standing	102·4	About 9 A.M. the animal was inoculated with sec from No. 15, in the same way as No. 17.
„ 7	„	72	27; standing	103·0	
„ 8	„	72	20; standing	102·0	
„ 9	„	68	24 to 30; standing	102·4	
„ 10	„	70	22; standing	103·0	
„ 11	„	100; standing	45	105·6	
„ 12	„	72	38; standing	105·8	The mucous membrane of the mouth is of a norm pale pink colour; on the lower lip there are seve very small opaque white elevated specks. The muc membrane of the vagina is injected and thickly stud with small opaque white elevations; slight crea discharge.
„ 13	„	72	34; standing	105·8	The animal lies almost constantly and is very unwill to get up. The eruption on the lower lip has c siderably extended; the patches are more numerous, the recent o being small, whilst those observed last night have become larg on the upper gum near the extremities of the dental pad there clusters of small elevated white specks closely set together but confluent. There is a slight discharge from the nose. The vag looks injected and rough, and the small elevations have much same appearance as last night; the discharge is abundant creamy.
„ 14	„	72	36	105·0	Still very unwilling to move. The lower lip n presents a continuous coating of a granular appe rance; on the upper lip there are some large white elevated patc which look like vesicles; but when these are scraped a mass soft white matter is removed, and a bare and raw surface is expos The papillæ are coated, and under surface of tongue patchy. T discharge from the nose continues. The vagina is in the same c dition as last night, but the discharge is less abundant.
„ 15	„	70	30	103·8	Both lips are covered with a thick white concretio the papillæ are thickly coated at their bases, and a f of them are denuded and bright red at their tips; the palate a the under surface of the tongue at the tip look patchy. T vaginal mucous membrane is of a bright red colour and is cove with tenacious discharge. The mode of breathing is characteris although the expiration sound is slightly audible.
„ 16	„	Found dead this morning.			

Case No. 20.—A small red bullock, hide-bound and very thin; brought from Tottenham on the 5th of February.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1866.				°	
Feb. 6	2 P.M.	96	26; standing	102·4	About 9 A.M. the animal was inoculated from No. 15 the same way as No. 17.
7	„	72	20; standing, and eating.	102·8	
„ 8	„	70	27; standing	102·8	
„ 9	„	76	22 „	103·0	
„ 10	„	72	22 „	103·0	
„ 11	„	74	21 „	103·2	
„ 12	„	72	18; ruminating	102·9	
„ 13	„	80	18; standing	103·0	
„ 14	„	88	18 „	105·1	On auscultation a coarse dry crackling sound is he in respiration.
„ 15	„	84	18 „	104·2	The animal still feeds and ruminates; fæces of nor consistency.
„ 16	„	72	18 „	105·3	The same crackling sound is still heard in auscultat The mucous membrane of the lower lip exhibits a very small elevations nearly opposite the corner te
„ 17	„	84	20 „	104·2	Still feeds well: slight constipation. The eruption the lower lip has extended, and now forms a se of circular circumscribed patches about each large as a millet seed; in one or two places patches are becoming confluent, and have a dep sion in the centre.
„ 18	„	80	36	104·6	There is diarrhœa, but the animal still feeds. T patches on the lower lip are found to have increa in number, but are not much larger; a few of th are confluent, but most of them are still separate.
„ 19	„	74	35	104·2	The animal still takes its food; diarrhœa contin The patches on the lower lip are now confluent continuous; the whole surface of the lower lip rough and has a nibbled appearance.
„ 20	„	72	27	99·2	Diarrhœa and prostration: 15 oz. of warm stout w administered at 5 P.M., repeated at 8, and again 11.30 the same evening.
„ 21	„	-	-	-	There is still roughness of the mucous membrane the lower lip; but it is of a pale colour and app rently healing Died this morning.

ASE No. 21.—A ewe, weighing 78 lbs., under observation before infection from December 20th to December 27th 1865, after infection from December 27th 1865 to January 6th 1866.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1865					
Dec. 20	8 0 P.M.	-	-	103·0	
„ 21	8 0 P.M.	66	28	103·2	
„ 22	8 0 P.M.	60	34; standing	102·8	
„ 23	8 0 P.M.	58	28; standing	102·3	
„ 24	8 0 P.M.	50	25	102·6	
„ 25	8 0 P.M.	59	28; standing	102·4	
„ 26	8 0 P.M.	62; standing	29	102·8	
„ 27	8 0 P.M.	58	28	103·4	
„ 28	8 0 A.M.	66; standing	30	104·2	The animal looks dull this morning.
„ „	8 0 P.M.	66	29	103·6	
„ 29	8 0 A.M.	60	47	105·0	The pulse feels hard and wiry, the artery very tense.
„ „	8 0 P.M.	63	39; standing	105·3	The conjunctivæ appear red and injected. The mucous membrane of the mouth feels very hot to the finger, and is of a uniform red colour.
„ 30	8 0 A.M.	68	32; ruminating	105·2	
„ „	8 0 P.M.	70; standing	31; standing	104·5	No change observed in the mucous membranes; it is, however, very difficult to make out the appearance of the mouth.
„ 31	8 0 A.M.	78; thready and the artery full.	33	105.0	The mouth still feels hot, and the papillæ are very red; there appear to be some spots on the mucous membrane of the lower lip. The fæces are of normal consistence, but are covered with slimy mucus showing very distinct streaks of blood.
„ „	8 0 P.M.	60; standing	32	105·4	The eyes look very red, and the tears are flowing down the left cheek. The mucous membrane of the mouth has a red appearance, and some of the papillæ are abraded. Two abraded spots are very distinct on the lower lip, one being on the right side opposite the two corner teeth, and one on the left side nearer the median line and towards the margin of the lip; these spots are of exactly the same character as those observed in the cattle, presenting in the centre a red irregular spot surrounded by a white elevated margin. On other parts of the lip there appear to be small white elevated rough specks, but these could not be distinctly seen as the animal was very restless. On examination of the mucous membrane of the vagina it presented uniformly an intensely red colour, with a slight creamy discharge. An eruption was found on the skin inside the thighs and near the teats.* The animal appears very dull and does not feed, the ears droop, and the eyes are half closed.
1866					
Jan. 1	8 0 A.M.	66	32; standing	103·5	Diarrhœa this morning; the animal appears very dull and does not eat.
„	8 0 P.M.	58	21	102·4	The eyes are less injected and the left eye looks brighter and drier. The mouth feels hot and the papillæ have much the same appearance as last night. The vagina presents a patchy surface and the discharge is more abundant. There is still purging.
„ 2	8 0 A.M.	63	26	102·3	The diarrhœa has stopped, and the animal feeds and ruminates.
„	8 0 P.M.	60	24	102·5	The mucous membranes seem almost healthy; the eyes look normal; the only trace of eruption anywhere is a slight red colour of the surfaces which were previously abraded; the vaginal mucous membrane is intensely red and is smeared with discharge. The animal seems lively and feeds well; fæces normal.
„ 3	8 0 A.M.	64	27	103·2	
„ „	8 0 P.M.	63	26	103·6	The mucous membranes all healthy.
„ 4	8 0 P.M.	60	20	103·3	The animal is completely recovered.
„ 5	8 0 A.M.	-	-	102·8	
„ „	8 0 P.M.	56; standing	20; standing	102·4	
„ 6	8 0 P.M.	56	28	102·3	

* This eruption consisted of papules surrounded by slight redness. A drawing of its appearance has been preserved.

ASE No. 22.—A ram, weighing 76 lbs.; under observation before infection from December 20th to December 30th 1865; after infection from January 1st to January 14th 1866.

Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1865.					
Dec. 20	8 P.M.	-	-	103·2	
„ 21	8 P.M.	68	26	103·2	
„ 22	8 P.M.	66	24	103·0	
„ 23	8 P.M.	64; standing	26; standing	102·4	
„ 24	8 P.M.	56 „	17	103·0	
„ 25	8 P.M.	61 „	19; standing	102·6	
„ 26	8 P.M.	60 „	22 „	102·8	
„ 27	8 P.M.	60 „	20	101·4	
„ 28	8 P.M.	64 „	21	102·8	
„ 29	8 P.M.	58 „	20	102·3	
„ 30	8 P.M.	60 „	20	103·4	
„ 31	8 A.M.	-	-	104·0	
„ „	8 P.M.	71; standing	25	104·6	The animal looks dull; the fæces are soft and passed in masses, and are coated with mucus of a slightly red tint. Weight taken to-night and is found to be 71 lbs., showing a loss of 5 lbs. since November 9th.
1866.					
Jan. 1	8 A.M.	64 „	26; standing	105·0	Is purging, and does not feed.
„ „	8 P.M.	72 „	26	104·7	

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Date.	Hour.	Pulse.	Respiration.	Temperature (Fahr.) in Rectum.	Remarks.
1866.					
Jan. 2	8 A.M.	62 „	22	104·8	The diarrhœa is worse this morning.
„ „	8 P.M.	74 „	23	105·0	Diarrhœa continues. The mucous membrane of th is of a deeper colour than natural, and presents and there a few very small white elevated specks c same kind as those observed in the cattle. The a was very restless during the examination of the m
„ 3	8 A.M.	67	23	104·6	
„ „	8 P.M.	64; standing	22; standing	105·4	The conjunctiva is injected, and the eyes are water no tears run down the cheek. The eruption i mouth is extending; the specks are larger and numerous, and many of them are confluent. Diar continues, and a good deal of mucus is passed wit fæces.
„ 4	8 A.M.	60; weak and thready.	19	105·0	Still purging, and does not feed.
„ „	8 P.M.	78; standing	21	104·6	The eyes are still injected, and at the inner canthus is a small quantity of dried-up discharge. The mu membrane of both lips is rough and is completely covered by the eruption; som the papillæ appear denuded of epithelium at the tips; the tip of the tongue is co with eruption; the epithelium on the lips and on the tip of the tongue has a so appearance. On examination of the scrotum and of the skin on the inside of the no eruption can be discovered. Is still purging; the fæces fœtid and slimy. animal does not feed, and looks dull; it moans occasionally, and grinds its teeth.
„ 5	8 A.M.	78 „	21	103·8	
„ „	8 P.M.	84 „	22; standing	104·3	The eyes and nose are clean. There is still the so appearance of the epithelium on the lips; pur continues, and the fæces are slimy. The animal not feed.
„ 6	8 A.M.	78 „ fluttering.	26 „	105·5	
„ „	8 P.M.	140; quite regular and distinct.	26 „	105·1	The eyes are watery, and their inner angles are incru with discharge. The patches inside the lips are appearing, but several small elevated spots are on the outside. The animal is not purging so m but still does not feed.
„ 7	— A.M.	120	19; unchanged in character.	104·0	
„ „	8 P.M.	110	22; standing	105·4	More patches are found on the lips; some of thes white and look like vesicles, others are becoming c up and crusted; the mucous membrane of the lip healing in the old places. The animal seems a g deal better to-night; the diarrhœa has stopped, altho the fæces are scarcely of normal consistence.
„ 8	8 A.M.	98	20 „	105·2	
„ „	8 P.M.	96	16	104·2	The patches on the lips are now all crusted and dry; mucous membrane of the mouth is assuming its nat appearance, and the only trace left of the eruption is a slight redness where the pat existed, as if the epithelium were not altogether reproduced; the eyes are dry and cl but the margin of the under eyelid is reddened. The animal is beginning to feed ag the fæces are still soft.
„ 9	— A.M.	108; standing	20 „	104·8	The animal looks very dull this morning, and does feed; diarrhœa has returned; the fæces are very f and fœtid.
„ „	8 P.M.	118; very weak and thready.	20 „	105·4	Anorexia and diarrhœa continue. The crusts on lips are dry, and some of them look as if scaling of
„ 10	8 A.M.	114; standing	23 „	105·4	
„ „	8 P.M.	120; irregular, weak, and thready.	26; standing	105·8	Constant straining while the bulb of the thermom was in the rectum.
„ 11	8 P.M.	108; standing; weak.	23	104·2	The animal appears very weak and is still purging, the marked symptoms of Rinderpest have now appeared; it eats very little.
„ 12	8 P.M.	108; standing; very weak.	24 „	—	
„ 13	8 P.M.	90; standing	22 „	104·5	Very little excrement was passed to-day; while temperature was being taken there were contin efforts to expel the thermometer.
„ 14	8 P.M.	92 „	28; standing	104·5	
„ 16	8 P.M.	- - -	- - -	104·2	The ram has been placed along with other sheep for last two days, and now feeds much better, and loo more lively.

Case No. 23.—A red and white heifer,* about 9 months old, admitted into the infirmary of the Royal Veterina College on the 30th of October; inoculated on the 1st of November 1865 with mucus scraped from the *septu narium* of a sheep,† which had died at or about the 12th day of Cattle Plague.

On admission, the animal was apparently in good health, but two days after inoculation, that is, before any of the symptoms of Cattle Plague had manifested themselves, it was observed to have a cough, and on applying the ear to the flanks, coarse crepitation was heard near the posterior margins of the lungs on both sides, while the inspiration sound was elsewhere accompanied with sibulous rhonchi.

The case agreed in all essential respects, and particularly as regards the general progress of the symptoms, with the others which were more carefully recorded. The pulse and respiration were noted twice a day, but the observations as to temperature and the condition of the mucous membranes were unsatisfactory. The first increase of temperatu occurred as usual in the course of the third day aft inoculation. There was a further increase on the d following, after which the readings of a thermometer the vagina were always above 105° Fahr. On the 5 day the instrument was accidentally broken. The pul varied during the first five days from 64 to 80, the greate frequency being observed on the first day. During th last day of life, the usual acceleration before death w recorded. At first the animal breathed about 60 times i a minute, but on the third day the breathing becam irregular, and on the fourth, assumed the character peculi to Cattle Plague. The frequency of the respirator movements was diminished to half, in consequence of th closure of the glottis during expiration, and each respi ratory act was accompanied with the peculiar grunt Death occurred in the usual way about the middle of th sixth day.

* *See* Dr. Bristowe's Report, No. 17.

† This sheep (No. 41 in Dr. Bristowe's Report) was inoculated by Professor Simonds with lachrymal discharge from the eye of a steer, to which latter animal, Cattle Plague had been communicated from other diseased sheep by natural infection.

Notes of Experiments by Dr. Sanderson, on the Effect of the internal administration and subcutaneous injection of solution of Bisulphite of Soda.

Case No. 24.—A yearling bullock, brought from Tottenham on the 13th of March; under observation before inoculation from March 13th to March 19th, after inoculation from March 20th to April 2d. The observations were made at 4 p.m. daily.

Date.	Pulse.	Respiration.	Temp.	Remarks.
1866.			°	
Mar. 14	80; standing	20; standing	101·6	
„ 15	80; „	36; „	102·2	
„ 16	68	27; ruminating	102.4	One drachm of solution of bisulphite of soda (one oz. to a lb.) injected.
„ 17	74	48	102.8	Injection repeated.
„ 18	76	30; standing	102.8	
„ 19	No observations made.			Injection repeated. Inoculation performed by subcutaneous injection in the perinæum of half a drachm of dialysed lachrymal fluid, collected by Mr. Crookes in Cheshire. [The injection of solution of bisulphite was again repeated in the evening.]
„ 20	78	24	102.2	The injection was repeated 3 times during the day.
„ 21	76	20; standing	102·8	Injection repeated 3 times as before.
„ 22	80	32	103·0	Ditto.
„ 23	74	38	102·8	Injection repeated twice.
„ 24	72	60	104·4	Injection performed once.
„ 25	75	54	105·3	Injection repeated.
„ 26	84	33; standing and feeding	104·5	Animal weighed; weight 358 lbs. Mucous membrane of mouth is of the natural pale pink colour; but there are several raised specks on the upper gum near the extremities. Injection continued.
„ 27	74	54; standing	105·8	The upper lip is studded with elevations; the same appearance is observed on the lower gum near the corner teeth, and here and there in the hollow of the lip. Injection continued.
„ 28	79	60	106·0	The animal lies usually, and is very unwilling to move. It eats little. The upper lip is completely coated with aphthous granulations, which are still adherent. On the lower lip the concretions near the corner teeth are becoming confluent, but in the hollow of the lip the patches are still circumscribed. The papillæ are somewhat reddened. There is much discharge of tenacious mucus from the nostrils. Injection continued.
„ 29	80	36	104·8	The animal lies constantly with the head extended, and is very unwilling to rise. It eats nothing. The fæces are soft, but scanty. Both lips are thickly coated with granular concretion, which is readily detached; the papillæ are coated round their bases, but denuded at their tips. About 12 oz. of blood were taken for analysis. Injection continued.
„ 30	66	50	103·0	The animal is more lively and begins to feed. The fæces are still rather fluid, but there has been no marked diarrhœa. The mucous membrane of the mouth is almost free from concretions. *Injection discontinued.*
„ 31	No observations made.		103·0	The animal lies a good deal, and is still unwilling to get up. It feeds and ruminates.
April 1	60	32	102·6	The fæces are still fluid, but the animal feeds well and ruminates regularly. The mucous membrane is of natural appearance, and there is no discharge from the eyes or nose.
„ 2	60	24	102·0	The animal is still unwilling to move, but in other respects in a healthy condition, excepting that there are subcutaneous abscesses in several of the spots in which injection has been performed.

Case No. 25.—A yearling heifer, brought from Tottenham March 13th.

Date.	Pulse.	Respiration.	Temp.	Remarks.
1866.			°	
Mar. 15	72; standing	26; standing	103·0	
„ 16	80 „	25 „	103·8	
„ 17	84 „	46 „	103·2	
„ 18	63 „	28 „	103·0	
„ 19	No observation.		103·0	Two drachms of diffusate of lachrymal fluid obtained from an animal affected with Cattle Plague were injected subcutaneously in the perinæum.
„ 20	Ditto		102·4	
„ 21	87	23; standing	103·3	
„ 22	72	28 „	103·1	
„ 23	68	24 „	102·8	
„ 24	70	30 „	103·0	
„ 25	66	22 „	102·6	
„ 26	74	28 „	103·4	
„ 27	84	46 „	103·2	
„ 28	No observation.		103·0	
„ 29	Ditto		102·6	
„ 30	Ditto		103·0	
April 1	Ditto		103·0	
„ 2	Ditto		101·0	
„ 3	64	30; standing	104·6	The animal was placed in another stable, it being apparent that it was infected. One ounce of the solution of bisulphite of soda was given by the mouth in the evening.
„ 4	84	30	105·3	One ounce and a half of the solution was given four times during the day.
„ 5	72	48; standing	106·6	The animal feeds as usual, and ruminates naturally. The fæces are more fluid than yesterday, and of alkaline reaction. On the lower lip there is a whitish patch of granular appearance, close to the frænum; the mucous membrane of the mouth is of natural colour. That of the vagina is slightly reddened around the clitoris.
„ 6	72	52; standing	105·9	The animal does not feed so well, but still ruminates. Fæces of natural consistence, alkaline. The lower gum and lip are studded with small white specks. There is a good deal of lachrymal discharge, and at the inner canthus of each eye there is a patch of membranous quasi diphtheritic concretion. The mucous membrane of the vagina is reddened, and is rough with minute granular elevations.
„ 7	69	44 „	106·4	The animal feeds less and less, and becomes weaker and more depressed. The fæces were of natural consistence in the morning, but became relaxed subsequently. The appearances of the lips and vagina are little altered, the patches of concretion being still separate.
„ 8	60	32, interrupted	105·6	The animal takes no food. The diarrhœa continues; the fæces are not fetid, of natural colour, and alkaline reaction. On the upper lip there are several clusters of patches of concretion; on the lower lip the concretions are confluent and extend to the prolabium, on which there are also several separate patches, having depressed centres and raised margins. The papillæ are reddened, and the tongue and palate patchy. The mucous membrane of the vagina is deeply injected, but not so much roughened.
„ 9	60	26, standing	102·8	The fæces are relaxed, pale coloured, and alkaline. The animal does not feed, but the mucous membranes of the mouth and vagina are resuming their natural appearance. The muzzle is dry, and exhibits numerous fissures.
„ 10	70	48, interrupted	104·0	The animal continues to improve; it is still weak and unable to rise, but feeds well. The diarrhœa continues; fæces alkaline. Visible mucous membranes healthy.
„ 11	No observation.		103·0	Diarrhœa continues.
„ 12	Ditto		102·0	Fæces still liquid, but the animal in other respects well. *The solution had been given daily since the 4th.*

Dr. Sanderson.

Report to Commissioners.

CASE No. 26.—A yearling heifer, brought from Tottenham on the 13th of March.

Date.	Pulse.	Respiration.	Temp.	Remarks.
1866.			°	
Mar. 14	84; standing, excited	24; standing	101·4	
„ 15	74; standing	26; „	102·0	
„ 16	66 „	18; „ ruminating	102·0	One drachm of solution of bisulphite of soda injected.
„ 17	72 „	30	102·2	Injection repeated.
„ 18	68 „	34; standing	102·2	Injection repeated.
„ 19	No observations.		102·2	Injection repeated three times during the day.
„ 20	Ditto		101·8	
„ 21	70	21; ruminating	102·2	[After this date no observations were taken until March 30th].
„ 30	No observations.		102·2	
April 1	Ditto		103·0	
„ 2	72	20; standing	Not recorded.	
„ 3	72	30	104·6	One ounce of solution of bisulphite of soda was given by the mouth. Animal weighed; weight 304 lbs.
„ 4	72	28	105·9	On the lower gum, opposite the left corner tooth, there is a small white opaque elevation as large as a hemp seed. An ounce and a half of solution were given by the mouth four times during the day, and a drachm and a half of the same solution were twice injected subcutaneously.
„ 5	68	44	106·2	The animal feeds well and ruminates regularly, but lies a good deal and appears dull. The alvine evacuations are alkaline. The patch opposite the left corner tooth has extended, and several others of smaller size have appeared on the opposite side. The upper lip remains healthy. The internal administration and the injections of the solution were continued as yesterday.
„ 6	68	22; interrupted	105·6	The animal is very dull, and is unwilling to rise, as if weak. It feeds sparingly. There are muscular twitchings. The fæces are firm and alkaline, but the fæcal masses exhibit no mucous coating. The lower lip is completely coated with granular looking concretion, and there is a large patch of similar appearance on the upper gum, with smaller patches on either side, all of which are transversely furrowed. The papillæ are reddened, and there are patches on the under surface of the tongue. There is much discharge from the eyes and nostrils.
„ 7	74	20; normal	104·8	The animal lies almost constantly. Emaciation less marked than in the other cases. Fæces slightly firm, alkaline. The mucous membrane of the mouth presents the same appearances as yesterday, but on the muzzle a chain of raised white patches are seen, which are continuous with those on the upper lip. The discharge from the eyes and nose is alkaline and more tenacious than yesterday.
„ 8	70	32; interrupted	104·2	The fæces were pale, fluid, and fetid in the morning, but more natural in the afternoon. The animal does not feed. Both lips are thickly coated with concretions; the patches extend from the upper lip to the muzzle, and from the lower to the prolabium and chin. The palate is covered almost continuously with patches, the papillæ present the usual appearances. The discharge from the eyes and nares is tenacious, abundant, and of alkaline reaction, the conjunctivæ are injected, and the eyes appear sunken.
„ 9	100, immediately after rising.	28	102·2	The animal is very weak, and lies almost constantly. The fæces are fluid, pale coloured, and fetid. The mucous membrane is pale and covered with an easily detached coating. It appears to be healing. The muzzle is very dry and exhibits several excoriations. The eyes are red and sunken. The discharge from the eyes and nares is as before. The animal died before 7 p.m. Weight after death 246 lbs. Loss of weight during the period of disease 58 lbs. *The internal administration and the injections of the solution were continued daily.*

CASE No. 27.—A yearling heifer, brought from Tottenham on the 13th March.

Date.	Pulse.	Respiration.	Temp.	Remarks.
1866.			°	
Mar. 14	74; standing	28; standing	103·2	
„ 15	76 „	21 „	102·2	
„ 16	68 „	16; ruminating	102·8	
„ 17	76 „	25 „	102·8	
„ 18	69 „	27; standing	102·5	
„ 19	No observations.		102·8	
„ 21	72 „	24	102·6	[No further observations were made until March 30th.]
„ 30	No observations.		104·0	
„ 31	Ditto		102·6	
April 1	Ditto		103·2	
„ 2	Ditto		102·6	
„ 3	72	32; standing	105·4	Animal weighed; weight 339 lbs.
„ 4	80	45	106·4	Two drachms of the solution of bisulphite of soda were injected subcutaneously twice during the day.
„ 5	66	45	106·0	Injections repeated. Fæces alkaline, slightly relaxed. The animal feeds and ruminates as usual. The lower lip appears redder than natural, and there are one or two small white elevated specks; but the surface is elsewhere smooth. The mucous membrane of the vagina is slightly hyperæmic, and coated with yellowish white tenacious mucus.
„ 6	66	62	106·2	The animal takes about half its usual quantity of food. The fæcal evacuations are more solid, and are alkaline. Both lips are studded with patches of granular appearance. The papillæ are reddened at their tips, and coated at their bases; there are patches on the tongue. The vagina is rough, and thickly coated with tenacious creamy discharge.
„ 7	60]	50; standing	105·8	The animal feeds sparingly. The fæces which were firmer than natural in the morning, became relaxed in the afternoon. Mucous membrane of mouth in the same state as yesterday. Vagina is not so red, but there is more discharge. Alkaline tenacious discharge from eyes and nose.
„ 8	62	45; normal	104·4	The animal feeds badly, and lies constantly. It appears to be unable to rise. Fæces relaxed, of natural colour, but alkaline and fetid. Urine is clear and of neutral reaction, and contains no albumen; specific gravity, 102·4. Both lips and gums are coated with white concretion of granular appearance. From the upper gum it extends to the muzzle and to the integument near the corners of the mouth. The tongue is patchy, and the papillæ are coated at their bases. The mucous membrane of the vagina is paler, and the discharge is diminished. Eyes and nose encrusted. [At 7 a.m. next morning the temperature was 104·2°. The animal died before 9. Weight after death 262 lbs. Loss of weight during the period of disease 77 lbs.] *The injections were repeated daily.*

Explanation of Plates.

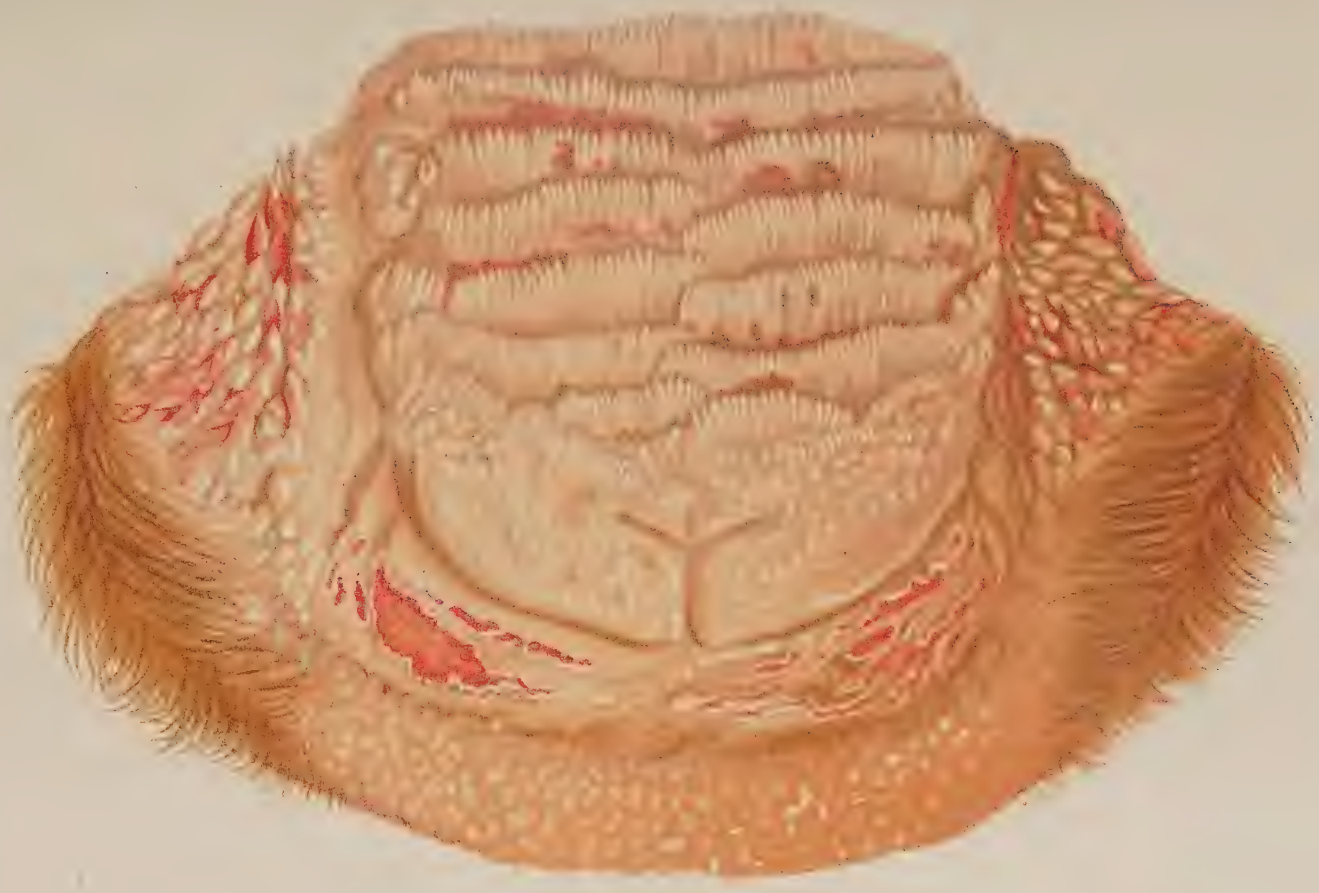
Fig. 1. Palate, papillæ of cheek, dental pad and upper lip at the sixth day of Cattle Plague. The epithelium of the palate is exfoliated here and there in patches; some of the papillæ are denuded and red, others retain their natural colour and appearance; on the dental pad, the patches of red, where the vascular layer of the mucous membrane is exposed, are edged with raised margins of thickened epithelium. The drawing was taken from an animal just dead, and accurately represents the appearances during life.

Fig. 2. Papillæ of internal surface of cheek, show similar appearances.

Fig. 3. Skin of udder at the 6th or 7th day, show in addition to the usual eruption, patches of redness on teats. (See Dr. Sanderson's Report, p. 15.)

Fig. 4. Skin of udder of the cow No. 16. The surf surrounding the teats was covered with a crimson ra somewhat resembling that of typhus. (See Dr. Sanderso Report, p. 47.)

Fig. 1



Dr B. Sanderson, Direxit

F. Burgess, del. Day & Son (Limited) Lith

REFORM CLUB
PALL MALL

Fig. 4

REFORM CLUB
PALL MALL

On the Chemical Pathology of the Cattle Plague.

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

W. MARCET, M.D., F.R.S.,

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Part I.

On the 18th of October 1865 I had the honor of ng requested by Her Majesty's Cattle Plague Comsion to undertake an investigation of the chemical hology of the cattle plague. I have accordingly apd myself with all diligence to an inquiry into the mical composition of the blood, muscular tissue, ne, milk, and bile of bovine animals suffering from the sent plague. In addition to this inquiry, I found it essary to institute a series of investigations on the mistry of bovine animals in the state of health in er to obtain a standard of comparison, wherefrom lraw results, as to the morbid changes due to the ease. It occurred to me that the most satisfactory de of proceeding, concerning the blood, urine, and k, would be to examine these fluids as obtained from lthy animals, which would subsequently, in succsion, be made to contract the disease, when the ve fluids would be again subjected to a similar mination. Thus I hoped to be able to trace so the gradual progress of the chemical changes proed by the disease.

In order to be able to carry out this mode of inry, I arranged with Dr. Sanderson that he would dly supply me with samples of blood, urine, and k from several of his bovine animals, destined to made to contract the disease, either by inoculation by infection. I was to have every day samples of urine and milk collected in the 24 hours from the mals when in health, and while in the state of ease until they died.

This plan, which was adopted, appeared to me in ry respect the most likely to yield important and stworthy results, it was, however, unavoidably ended with the following circumstances :—

1st. Some of the animals experimented upon re-ered, so that after being subjected to a lengthened ies of inquiries during health, it was impossible undertake a similar investigation at the worst stage the disease, or that preceding death. The inquiry s not, however, void of interest, as this circumstance s calculated to show the changes occurring during gradual return from the morbid to the normal dition.

2nd. This method of investigation to be properly ried out required much time, as an equal amount abour had to be bestowed on the chemical examina- of the animals in health and in disease. This rk I considered, however, to be indispensable, in er to obtain thoroughly reliable results.

The results I have so far obtained are embodied the present part * of my report; they should be con-ered more as an indication of those to be arrived at m a further series of inquiries (conducted in a ilar manner) with which I am engaged, than as itive facts.

My results can, however, in one case be admitted conclusive. I refer to those obtained from the amination of the muscular tissue in health and ttle plague) disease.

I must acknowledge the valuable aid of my assis-ats, C. Vogt, Ph. D., who in addition to other work nnected with the present inquiry, undertook under supervision the determinations of urea; and Mr. M. J. Salter of the Royal College of Chemistry. I may also be allowed to state that I received every attention and assistance at the Albert Veterinary College where Dr. Sanderson's animals were kept. Diseased meat was also kindly supplied to me from the Royal Veterinary College, and by Mr. G. T. Brown, of the Veterinary Department of H.M.'s Privy Council Office.

I shall proceed to report under the following heads the particulars of my investigations :—

1st. The Blood.
2nd. The Muscular Tissue.
3rd. The Urine.
4th. The Milk.
5th. The Bile.*

The Blood.

The blood of a cow was analysed at four different periods, viz., twice (at an interval of two days), while the animal was in health, once eleven days after it had been inoculated with the plague poison and while suffering most from the disease, and once after the animal had recovered from the urgent symptoms and was rapidly improving.

The characteristic difference between the blood, from the animal in disease and in health, will be found in the amount of fibrin and extractive matters ; while the healthy blood contained 3·4 (Analysis No. 1) and 3·5 (Analysis No. 2) parts of fibrin in 1,000 parts, that from the diseased animal contained 6·4, or nearly twice as much fibrin. It will be interesting to observe that as the cow was recovering, the proportion of fibrin (5 parts in 1,000) was showing a gradual decrease. The proportion of extractive matters in the blood of the diseased animal (6·6) was less than before inoculation, viz., 13·05, which proportion had not yet altered at the stage of recovery when the blood was next obtained.

The proportion of albumen was found to vary in the four analyses, but no conclusion can yet be drawn from this circumstance, as the variation of the albumen in the two analyses of the healthy blood was greater than the difference between the average proportion of albumen in health and that found in disease.

I made a number of preliminary experiments, in order to ascertain which was the best method to be adopted for the analysis of the blood, and, finally, I proceeded as follows :—

Three quantities of blood were collected directly from the jugular vein of a cow in three weighed bottles, two of them containing copper wire bent into a mass, or strips of sheet copper. The bottles with the copper and blood were shaken, when the fibrin adhered very completely to the metal.

The water and residue were determined by subjecting to evaporation the blood contained in the bottle free from copper, and drying the residue at 266° F. The incineration of this residue with spongy platinum yielded the amount of mineral constituents contained in the blood which had been dried.

The albumen was estimated by dialysing a certain quantity of blood for about 24 hours, mixing a part of it with water up to a known bulk and boiling it with a little chloride of ammonium, or by adding water to a certain volume of blood, allowing it to stand till the

* From the time necessarily required for my investigation, I re thought it better to report occasionally the progress of this uiry, than to wait to send in my report till the investigation s completed.

* The investigation of the urine, milk, and bile is not yet in a sufficiently advanced stage to be described in this part of my report.

Dr. Marcet. Report to Commissioners.

next day, and then boiling a part of this diluted blood with a little chloride of ammonium.* In both cases the globules were dissolved. Thus the albumen obtained by coagulation was not only that present in the serum, but also the proportion of this substance which existed in the blood corpuscles.

The albumen and filter were dried, and the impure albumen determined by subtracting from the dry mass the weight of the filter. A correction was now required for mineral matters and hæmatine contained in the coagulated albumen. The mineral matters were obtained by burning the dry albumen, and the hæmatine was calculated from the quantity of colouring matter found in 100 parts of healthy ox blood, according to Berzelius and Mulder, viz. 0·732 (Lehmann, Vol. I. p. 305.) Any difference in the amount of colouring matter present in diseased blood could not possibly cause any material error as to the estimation of its albumen, from the small proportion of colouring matter in blood. Both the ashes and colouring matter of the dried albumen being subtracted from it gave the weight of the pure albumen.†

The fibrin after separation from the copper wire or strips of copper to which it adhered was placed on a piece of fine brass wire gauze and washed with a stream of water till colourless. This method yielded very satisfactory results.‡

Analysis of Blood from a Cow in Health and (Cattle Plague) Disease.

Blood drawn on the 22nd November 1865.

Analysis No. I.

In Health.

Water	823·6	
Albumen	150·6	161·9
Fibrin	3·4	
Mineral constituents	7·9	
	985·5	
Solid constituents	176·4	
	161·9	
Extractive matters	14·5	
Specific gravity of blood		1048

Blood drawn on the 24th November 1865.

Analysis No. II.

In Health.

Water	838·8	
Albumen	138·0	149·6
Fibrin	3·5	
Mineral constituents	8·1	
	988·4	
Solid constituents	161·2	
	149·6	
Extractive matters	11·6	
Average extractive matters		13·05

Blood drawn on the 11th December 1865.

Analysis No. III.

After Inoculation.

Symptoms of the Disease somewhat urgent.

Water	846·2	
Albumen	132·8	147·2
Fibrin	6·4	
Mineral constituents	8·0	
	993·4	
Solid constituents	153·8	
	147·2	
Extractive matters	6·6	
Specific gravity of blood		1043

Blood drawn on the 20th December 1865.

Analysis No. IV.

The Animal recovering rapidly.

Water	852·3	
Albumen	127·2	140·1
Fibrin	5·0	
Mineral constituents	7·9	
	992·4	
Solid constituents	147·7	
	140·1	
Extractive matters	7·6	
Specific gravity of blood		1040

The Muscular Tissue.

When a piece of fresh beef, or in other word the muscular tissue of a cow or ox, is immersed i water, the fluid becomes charged with albumen, whic has issued from the meat into the water; thus, meat be steeped into lukewarm water with the objec of making broth, the water when boiled will yield a abundant coagulum or scum, consisting of albumen in the process of salting meat, the brine is likewis found to contain a quantity of albumen, which ha diffused * out of the meat.

Having immersed in water a piece of flesh from cow that had died of the plague, I observed that th amount of albumen which diffused from it was appa rently less than that which would have diffused fro a piece of sound flesh of the same size and weigh and it occurred to me that some similar change migh also take place in the diffusibility from flesh of potas and phosphoric acid, the two principal mineral con stituents of its juice. As the rate of distributio of the constituents of juice of flesh through th

* This last method, after the first two or three analyses, was adopted exclusively.

† It is customary to determine the albumen in the serum, only; but the result obtained falls short considerably of the whole quantity of albumen contained in a given amount of blood. For this reason I have thought it best to adopt the method I have described.

‡ As it is stated by Lehmann (Physiological Chemistry, Vol. I., p. 356), that the methods for the determination of fibrin in blood are more or less deficient in accuracy, I convinced myself that the process I adopted was not open to this objection. In the case of each of the seven analyses (but one) given above, two different quantities of blood were taken, and the fibrin washed for different lengths of time. The proportions of fibrin found in the six different samples of blood, and the average results of the two determinations for each case, were as follows :—

		Mean.	Difference per thousand.
Blood, analysis No. II.	3·43 / 3·64	3·5	0·21
„ „ No. III.	6·60 / 6·30	6·4	0·30
„ „ No. IV.	4·98 / 5·02	5·0	0·04
„ „ No. V.	4·75 / 4·88	4·8	0·13
„ „ No. VI.	5·38 / 5·56	5·5	0·18
„ „ No. VII.	5·78 / 5·59	5·7	0·19
	Mean		0·17

The mean difference, 0·17 per 1,000, is so small that the method employed for the analysis appears unobjectionable, at all events the results can be safely compared with each other.

* Although the word "*diffused*" in this case is not scien tifically correct, I prefer to retain it in the present report from want of a better one to express the exit of albumen from mea into water.

cular tissue, or in other words, the diffusibility he constituents of juice of flesh out of flesh into er, must act an important part in the nutrition nuscular tissue, an inquiry into the diffusibility of constituents of ox-flesh into water, in health and he case of bovine animals which had died of the gue, could not fail to yield results of much interest importance in connection with the pathology of cattle plague. I have, therefore, given this part he subject some degree of attention.

t was necessary to begin by investigating the diffu- lity of phosphoric acid, albumen, and potash from thy flesh into water, in order to obtain a standard omparison, whereby to judge of the changes, as to diffusibility of these substances from the flesh of nals that had died of the plague.

therefore proceeded in the following way :—

087 grains (200 grammes) of cow or ox-flesh, free n fat, and consisting, as far as possible, of one piece *, were immersed in 8804 grains (500 cubic centi- res) of distilled water, heated to a temperature of F. (37° C.), and allowed to remain undisturbed at temperature for a period of four hours. At the e time 3087 grains (200 grammes) of flesh, as often ossible adjoining the piece of muscle used in the usion experiment, were finely minced, and treated mortar with 8804 grains (500 c. c.) of distilled er, and the extract thus prepared was strained ough calico, and filtered through paper. Both the act and diffusate were analyzed for phosphoric * albumen, and potash.

made three series of analyses, (see p. 58, analysis of acts and diffusates of ox flesh) each series including determination of the above substances in one diffu- and extract obtained from healthy ox flesh. The lts showed that there exists very little, if any erence between the proportions of phosphoric acid, men, and potash in the diffusates of each series, pared with each other, and in the extracts of each es, also compared with each other; and consequently, the healthy nutrition of flesh, its juice, whether it he extract or the diffusate, must contain (probably rever between certain limits) fixed proportions of se constituents, which are shown in the following e :—

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·53	3·65
Potash	1·43	1·57

ery interesting fact in a physiological point of w, and one which it is important to consider under present circumstances. Taking the phosphoric l as I., we would have in each analysis—

Analysis I.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·32	3·75
Potash		

Analysis II.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·70	3·75
Potash	1·37	1·39

Analysis III.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·56	3·46
Potash	1·50	1·75

* The phosphoric acid was determined with acetate of uioxide of uranium.

Average of the Three Analyses.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·53	3·65
Potash	1·43	1·57

Now if the albumen diffused from flesh into water, at a rate equal to that of the diffusion of phosphoric acid out of flesh into water, it stands to reason that the proportion of albumen to the phosphoric acid in the diffusate would be the same as the proportion of albumen to phosphoric acid in the corresponding extract. If, on the other hand, the diffusibility of albumen was not the same as that of phosphoric acid, we would expect to find a difference between the proportion of albumen and phosphoric acid in the diffusate, and the corresponding proportion in the extract. The same remark applies to potash and phosphoric acid as to their relative diffusibility out of flesh into water.

By comparing the proportions of phosphoric acid and albumen, and phosphoric acid and potash, two by two in each analysis, the results were as follows :—

	Analysis I.	Analysis II.	Analysis III.
Diffusibility of phosphoric acid	I.	I.	I.
Diffusibility of albumen	0·402	0·386	0·362
Diffusibility of potash		1·024	1·170

Average Diffusibility of Phosphoric Acid, Albumen, and Potash out of flesh into water.

Phosphoric acid	I.
Albumen	0·383
Potash	1·092

Therefore the diffusibility of albumen is less than that of phosphoric acid by the relation of 0·383 to I., and the diffusibility of potash is nearly the same as that of phosphoric acid by the proportion of 1·092 to I.

I shall now proceed to apply the same mode of reasoning to the consideration of flesh of bovine animals which have died of the plague. I have made three series of analyses of the diffusate and extract of diseased meat, adopting precisely the same process as in the case of the healthy flesh. The following were the proportions of phosphoric acid, albumen, and potash in the extracts and diffusates.

Analysis I.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	9·55	2·36
Potash	0·95	1·28

Analysis II.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	13.65	3·07
Potash	1·12	1·37

Analysis III.

	Extract.	Diffusate.
Phosphoric acid	I.	I.
Albumen	17·66	3·10
Potash	1·23	1·19

These relations show at a glance that while in healthy flesh the proportions of phosphoric acid to albumen in both extracts and diffusates of the three analyses are nearly the same when compared respectively with each other, in the diseased flesh the proportions of phosphoric acid to albumen in the extracts are subject to great variations, these proportions varying from 9·55 to 17·66, which will be observed to be owing, not to a decrease in the phosphoric acid, but to a

larger proportion of albumen being dissolved in the extract, these proportions being in Analysis II. and III., 13·65 and 17·66.

If instead of comparing with each other the proportions of albumen and phosphoric acid in the extracts, we consider the *quantities* of albumen in the extracts of healthy flesh together with the *quantities* of albumen found in the extracts of diseased flesh (see next column), the table will be as follows :—

	Albumen in extracts of healthy flesh.	Albumen in extracts of diseased flesh.
Analysis I.	4·987	6·176
„ II.	4·820	8·082
„ III.	5·096	9·805*

showing that considerably more albumen is dissolved out in the extracts of diseased flesh, than in those of healthy flesh.

There remains to inquire into the diffusibility in flesh (or from flesh into water) of albumen and potash proportionately to that of phosphoric acid, and this will be done, respecting diseased flesh, by arguing precisely in the same way as in the case of healthy flesh.

I have shown that in healthy flesh albumen was not so diffusible as phosphoric acid by the proportion of 0·383 to I.; by comparing together the proportions of phosphoric acid, albumen, and potash in the diffusates, with the proportions of these substances in the extracts, two by two—I mean the phosphoric acid of the extract with that of the diffusate, the albumen of the extract with the diffusate, and so on for the potash—we shall have to consider the following table :—

TABLE showing the relative DIFFUSIBILITIES in DISEASED FLESH, of PHOSPHORIC ACID, ALBUMEN, and POTASH.

In Analysis No. I.	I.	II.	III.
Phosphoric acid	I.	I.	I.
Albumen	0·247	0·225	0·175
Potash	1·350	1·223	0·968

Therefore, in diseased flesh the diffusibility of the soluble albumen it contains compared with that of the phosphoric acid is considerably less than in healthy flesh, the numbers being 0·247, 0·225, and 0·175 in disease, instead of the average number 0·383 representing the diffusibility of albumen from flesh in health.

The diffusibility of potash from flesh compared with that of phosphoric acid, will not be found to differ much in disease and in health, the numbers being 1·350, 1·223, and 0·968 in disease, instead of the average number, 1·092, representing the diffusibility of potash from flesh in health.

There are consequently two results from these investigations, which appear to me possessed of much interest and importance in their connexion with the pathology of the cattle plague :—

1st. That a given weight of diseased ox flesh contains a larger quantity of soluble albumen than an equal weight of healthy ox flesh.

2nd. That the albumen in the flesh of the diseased animals diffuses at a slower rate throughout this tissue than the albumen in healthy flesh.

It appears, therefore, either as if the muscular fibre itself underwent a process of solution in the water used for making the extract, being converted into albumen, or else as if more albumen was taken by the muscle from the blood than occurs in health, the excess becoming fixed to the muscular fibres instead of circulating through the minute channels which permeate in every direction the muscular tissue. Perhaps both these phenomena take place; the fact I have frequently observed that the diseased minced muscular tissue, after extraction with water, assumes the form of a gelatinous pulp instead of a fibrinous mass, as occurs in the case of healthy ox-flesh, favours the view of the actual solubility, or albuminous degeneration, of the muscular fibre in the cattle plague; I have also very often although not always, noticed that by squeezing and rubbing between the finger and thumb a fragment of diseased muscle, it appeared to dissolve away, while with a fragment of healthy muscle the fibrinous feeling of the substance could not be destroyed.

The following are the actual results obtained by submitting to analysis the extracts and diffusates of flesh healthy and diseased. I have thought it advisable to insert both series of analysis close to each other, in order to admit of their being readily compared together.

ANALYSIS of EXTRACTS and DIFFUSATES of OX FLESH, healthy.

	Analysis I.		Analysis II.		Analysis III.	
	Extract.	Diffusate.	Extract.	Diffusate.	Extract.	Diffusate.
Phosphoric acid	0·535	0·192	0·497	0·327	0·533	0·238
Albumen	4·987	0·720	4·820	1·227	5·096	0·824
Potash	—	—	0·683	0·455	0·802	0·417

ANALYSIS of EXTRACTS and DIFFUSATES of OX FLESH, diseased.

	Analysis I.		Analysis II.		Analysis III.	
	Extract.	Diffusate.	Extract.	Diffusate.	Extract.	Diffusate.
Phosphoric acid	0·647	0·227	0·592	0·157	0.555	0·242
Albumen	6·176	0·535	8·082	0·782	9·805	0·750
Potash	0·616	0·292	0·661	0·215	0·685	0·287

It would have been interesting to ascertain whether the quantities of kreatine and lactic acid were the same in diseased ox-flesh as in healthy flesh, but there is no method of analysis sufficiently reliable to admit of this inquiry being undertaken.

I have ascertained qualitatively that diseased ox flesh contains kreatine and lactic acid, two substances known to exist in healthy flesh.

Finally, I observed that the aqueous extract of diseased flesh had an acid reaction, as occurs in the case of the flesh of healthy animals.

PART II.

EXAMINATION OF THE URINE.

An arrangement at the Albert Veterinary College, for which I am much indebted to Dr. Sanderson, allowed of the whole quantity of urine voided every 24 hours to be obtained, a circumstance necessary to enable me to make a satisfactory daily examination of the urinary secretion of the animals under observation. With the object of collecting the urine, the floors of two of the experiment-stalls were lined with sheet lead, and slightly inclined, their outer edge being shaped into a gutter, by which means the urine voided by the animal in each stall was conveyed into a separate trough; the floors were carefully kept clean, in order to prevent any admixture of the intestinal evacuations with the fluid which it was proposed to examine. Notwithstanding this precaution, it happened that a small quantity of the intestinal evacuation was washed into the trough. The amount of urine passed every

* These numbers do not represent the whole of the albumen contained in 3087 grains of flesh, but the method of extraction being precisely the same in the case of healthy and diseased flesh, these quantities may be safely compared with each other. I have never noticed any blood to ooze out of the section of a diseased muscle, and consequently the present increase of albumen cannot be considered as due to any blood remaining, after death, in the capillary vessels of the muscular tissue.

ours by the animals under observation was noted
register kept at the Veterinary College.
he results I have, so far, obtained from my inquiries
his part of the subject are disposed in the form of
es (pages 60 and 61), each of which (with the
eption of the condensed table of average results)
divided into six columns, headed as follows :—
st. Dates ; 2nd. Quantities (passed) in 24 hours ;
Specific gravity ; 4th. Degree of alkaline re-
on ; 5th. Urea in 24 hours ; 6. Observations.
he dates are those on which the urine was voided.
he quantities passed in 24 hours are extracted
n the register kept at the Veterinary College.
he degree of alkaline reaction is shown by the
ber of grains of oxalic acid necessary to neutralize
pint of the urine. It was determined with red
paper and yellow turmeric paper, which both
e throughout corresponding results,—the turmeric
er ceasing to turn brown at the same time as the
litmus paper was no longer made blue by the
ie under examination.
discarded the use of blue test paper, as in some
es it was discoloured by what might apparently be
sidered as a bleaching action of the urine.
may be allowed to premise that I have so far
nd the urine of the animals experimented upon to
alkaline, with the exception of one case, in which
as neutral ; but there may exist a source of error
his part of the inquiry which it was found very
icult, if not impossible, to obviate, owing to the ad-
ture of a small quantity of the intestinal evacua-
is with the urine, wherefrom a putrefaction may
e been induced, owing to which the reaction of
fluid would be modified. No doubt but that in
ny instances the urine smelt strongly, as from
omposition. From this circumstance, average
parative results on this part of the inquiry can
y be considered as apparently calculated to give
able information.
The urea was determined by volumetric measure-
nt (according to Liebig's method), with a normal
ution of nitrate of mercury ; and in order to be
tain of the correctness of the process, I undertook
following experiment :—Having determined the
antity of urea contained in a certain bulk of urine,
dded to another measured sample of the same fluid
known weight of urea ; I now determined the whole
antity of urea contained in this last fluid by adopting
e method I was engaged in testing, when the result
this inquiry yielded a quantity of urea proportional
that which had been discovered in the first sample,
as that which had been added to the second ; this
uld not have happened had there been any error in
e mode of analysis.
The column headed "observations" needs no com-
ent. I may, however, take this opportunity of
ating that I hope to be able to inquire fully into the
estion as to the presence in or absence of albumen
om the urine of animals suffering from the Cattle
ague. I have examined—

1. The urine of a cow, known in Dr. Sanderson's
gister as cow No. 6. The experiments were begun
hile the animal was in perfect health, they were con-
nued during its illness (which had been induced by
oculation), and during the first stage of the animal's
covery.

2. The urine of the bullock, known as No. 3, before
ie animal had fallen ill, and during the disease (in-
uced by infection), till death.

3. The urine of a cow, known as No. 5, from the
rly symptoms of the disease (induced by infection) till
eath.

The tables showing my results from this part of
ie inquiry are headed — *Examination of Urine*,
ables I., II., III., and IV. The fourth table gives
a glance the information contained in the three
hers, under the form of average statements. This
ble is divided into three columns, the first being
eaded *Specific gravity ;* the second, *Degree of*
lkaline reaction ; and the third, *Urea in 24 hours.*
The average results obtained from the examination of the urine of the three animals are introduced into these three columns. In the case, however, of cow No. 5, the number of observations is not large enough to admit of the calculation of averages ; the actual numbers are therefore given, showing specific gravity, &c., for the first observation—shortly after the animal had fallen ill, and for the last observation—when the animal was dying.

Examination of Urine of Cow No. 6.

This cow, destined to be inoculated with the plague virus, was placed in one of the stalls fitted up so as to allow of the urine being collected, and on the 21st November I commenced examining daily its urinary secretion ; the inquiry was continued till the 14th December. On the 1st December the cow was inoculated with the virus of a diseased animal, and on the 4th it showed the first sign of disease by a rise in its temperature. The symptoms continued increasing in urgency till the 7th December, when, according to Dr. Sanderson's observations, the animal's temperature was highest. From that day an improvement took place, and it rapidly recovered.

I shall now refer to Table IV., which shows the average results in the present case to be as follows :—

Specific gravity. — The average daily specific gravity of the urine voided from the 21st November until the 4th December, or three days after inoculation, when the symptoms of the disease first appeared, was 1046.

The average specific gravity of the urine voided from the 4th December till 7th December, or during the acute stage of the disease, was 1042.

The average specific gravity of the urine voided from the 7th December to the 14th December, or during the first stage of recovery, was 1039.

Therefore, in the present case the specific gravity was lower during the acute stage of the disease than in health ; during the first stage of recovery it had, however, continued to fall.

By an inspection of Table I., *Examination of Urine*, it will be seen that the specific gravity of the cow's urine varied from 1038 to 1051 (11 observations), when the animal was in good health ; that it varied from 1039 to 1045 (four observations) during the acute stage of the disease ; and that it was found to be from 1031 to 1045 (eight observations) during the first stage of recovery.

I shall presently return to the subject of the specific gravity of the urine subjected to the present inquiry, when it will be seen that the results obtained from the other animals correspond with those derived from cow No. 6.

Reaction.—There appears to be a discrepancy between the degree of alkaline reaction in this case and in the other two, as during the acute stage of the disease my table of average statements shows for cow No. 6 an alkaline reaction more marked (198·88) than while the animal was in good health (153·80), the reaction falling when the animal was recovering (171·13). This may perhaps be due to decomposition or to the peculiar circumstances of the case, as cow No. 2, the subject of the present remarks, had been inoculated with the Cattle Plague poison, and had not contracted the disease by infection, while the two other animals had not been inoculated, but had fallen ill from infection, and died.

Urea passed every 24 hours—The table of average results shows that there is a very obvious difference in the amount of urea voided by cow No. 6 during the acute stage of the disease, and in health ; the average quantity passed daily during the acute stage being 2197·5 grains, and while the animal was in health 1487·4 grains, equal to an excess of 48 per cent. in disease. This is a very interesting result, which appears confirmed by the fact of the average quantity of urea passed daily again falling off to 1711 grains while the animal was recovering. As will presently be seen, a similar result was obtained in the cases of the two other animals.

Dr. Marcet.

Report to Commissioners.

By referring to the Table No. I., *Examination of Urine*, it will be observed that the diseased cow No. 6 voided daily in its urine from 2071·3 to 2472 grains of urea, but that this same animal while in health only passed every 24 hours from 946·7 to 2101·3 grains of urea. It may also be noticed that when recovering from the disease, the animal's daily excretion of urea amounted to from 1154·8 grains to 2295·0 grains, which is less than during the acute stage, as might have been expected.

The determination of the mineral constituents of this urine was undertaken on four different occasions, viz., twice while the animal was in good health, once close to the peirod when exhibiting the first symptoms of the disease, and once during the most acute stage. It is very interesting to observe the fall in the amount of mineral salts excreted in the urine in 24 hours as the disease was progressing; for while they amounted on an average to 3440 grains in health, they had diminished to 2453 grains when the animal was falling ill, and to no less than 1278 grains during the acute period, or about one-third the amount excreted in health.*

Urine of Bullock No. 3.

This animal was not inoculated, but took the disease from exposure to infection. As in the preceding case, I examined its urine for the determination of specific gravity, reaction, and urea. The inquiry was commenced on the 28th November; on the 13th December the temperature of the animal began rising, an indication of its having contracted the disease; it soon became worse, and died on the 19th December.

Specific gravity.—The specific gravity of this bullock's urine was much lower in the state of disease than it had been in health, being on an average (*see* Table IV. for average results) 1037, from the time the animal was first attacked till death, while it had been 1050 previous to the bullock falling ill. In health the specific gravity of the animal's urine varied (*see* Examination of Urine, Table No. II.) from 1045 to 1058 (14 observations), and in the state of disease it continued falling without intermission from 1049 to 1022 (7 observations). This is a very interesting fact to record.

Reaction.—The average degree was considerably less while the bullock was ill (141·25), than it had been while it was in good health (188·75). Before the first symptoms had shown themselves, the alkalinity had varied from 144·63 to 226·15 (14 observations). The first sign of the animal falling ill was shown by a rise in its temperature, on which day the reaction of the urine was 197·22 (grains of oxalic acid to neutralize one pint of the secretion); this degree of reaction fell, with but one intermission, till the 18th, when it was 85·03. The urine passed from the 18th to the 19th suddenly exhibited an increased degree of alkalinity, marked by 100·80; the animal died on the 19th, and the alkalinity of the very last urine voided, had again risen to 124·47.

This sudden increase in the degree of alkaline reaction of the urine just before death is difficult to account for, and may have been due to decomposition.

Urea passed every 24 hours.—The average amount of urea excreted every 24 hours by bullock No. 3 was, as in every one of the other cases, greater while the animal was labouring under the disease than while it had been in good health, viz., 1325 grains in disease, and 1177 in health, the average excess being 13 per cent. In the present instance the quantity of urea passed continued increasing, with but one intermission, from the 14th December (1129·04, on which day the first sign of infection was evinced by the increased temperature of the animal,) till the 19th December, when the urea contained in the 24 hours' urine amounted to 2042·31 grains.

* The mineral constituents were determined by evaporating to dryness a known bulk of the urine, and incinerating the residue *with spongy platinum* in order to avoid any loss of phosphorus.

Urine of Cow No. 5.

The examination of this urine was commenced the 18th December, by which time the animal already contracted the disease by infection; inquiry was, therefore, limited to the investigatio the alterations which occurred in the condition of urine during the progress of the disease till dea the animal died in the night of the 21st December.

It is not possible in this case, from the sr number of observations, to take average results, the conclusions to be drawn from the individual servations are similar to those obtained from examination of the urine of bullock No. 3., viz., *specific gravity* of the urine voided fell from the f day of the inquiry, when it was 1025, until dea when it was 1016; the final observation was made the urine extracted from the animal's bladder af death, when a slight rise had taken place, the spec gravity being then 1020.

The reaction of the urine of cow No. 5 was all line in the five first observations, the sample l examined, or that extracted from the bladder af death, was found to be neutral. The degree alkaline reaction diminished gradually without a intermission from 105·18 to 52·59, and then becar neutral.

Urea passed every 24 hours.—The amount of ur excreted showed in this case, except on the thi day, no decided tendency to rise as the animal becar worse, but it will be observed that the averag 1605·2, is higher than the average amount excret by any of the other animals while in health. T daily amount of urea excreted in the present case w first 1754·7 grains; two days later 2021·75 grain and the next day only 1423·55 grains.

Examination of Urine, Table I.

Degree of Alk. Reaction = Grains of Oxalic acid necessary to neutralize 1 Pint Urine.

Urine of Cow No. 6, in Health and after Inoculation.

Dates.	Quantities in 24 Hours.	Specific Gravity.	Degree of Alkaline Reaction.	Urea in 24 Hours.	Observations.
Morning to Morning. Nov.	pints. oz.			Grains.	
21 to 22	9 13	1038	126·22	1302·7	Mineral constituents, 37·3 per 1,000, or 3,149 grains in 24 hours.
22 „ 23	10 11	1038	127·10	1442·7	
23 „ 24	10 17	1043	177·06	1445·5	Mineral constituents, 39·3 per 1,000, or 3,731 grains in 24 hours.
24 „ 25	7 4	1051	149·14	946·7	
25 „ 26	8 0	1049	149·89	1739·2	
26 „ 27	7 8	1051	144·63	1011·9	
27 „ 28	9 4½	1047	149·01	2101·3	
28 „ 29	6 18	1046	158·65	1306·7	
Evening to Evening.					
29 to 30	8 15	1047	184·07	1994·2	
30 „ 1 Dec.	5 10	1048	163·91	1181·1	Inoculated 1st Dec.
2 „ 3	6 11	1051	162·16	1889·1	Mineral constituents, 42·8 per 1,000, or 2,453 grains in 24 hours.
3 „ 4	8 2½	1044	181·44	2071·3	Temperature rising 4th Dec., 7th Dec. highest temperature.
4 „ 5	8 16	1045	185·45	2136·8	
5 „ 6	8 17	1042	198·97	2110·0	
6 „ 7	10 0	1039	229·65	2472·0	
7 „ 8	11 0	1031	181·44	2295·0	
8 „ 9	6 14	1035	210·37	1924·5	Mineral constituents of urine, 8th, 9th Dec., 21·8 per 1,000, or 1,278 grains in 24 hours.
9 „ 10	6 4	1039	212·13	1967·5	Temperature decreasing, animal recovering.
10 „ 11	4 11	1040	189·33	1423·8	
11 „ 12	4 5	1045	175·32	1154·8	
12 „ 13	6 4	1043	134·00	1489·1	
13 „ 14	8 17	1038	124·47	1722·2	
—	—	1038	142·01	—	

Examination of Urine, Table II.

Urine of Bullock No. 3, in Health and Disease.

ates.	Quantities in 24 Hours.	Specific Gravity.	Degree of Alkaline Reaction.	Urea voided in 24 Hours (Grains).	Observations.
Nov.	pints. ozs.				
to 28	4 7	1050	149·01	930·40	
„ 29	4 15	1049	188·46	1094·90	
„ 30	4 17	1045	179·70	1156·36	
1 Dec.	5 15	1047	144·63	1290·33	
c. to 4	10 6	1051	207·74	1485·12	
„ 5	4 10	1053	162·15	1021·62	
„ 6	4 3	1055	197·22	1087·83	In health.
„ 7	4 17	1048	226·15	1220·10	
„ 8	5 11½	1048	198·98	1186·46	
„ 9	5 12½	1048	203·36	1221·80	
„ 10	5 10	1052	220·89	1248·66	
„ 11	4 7	1053	194·60	1208·68	
„ 12	3 0	1058	192·84	1305·00	
„ 13	4 8	1050	178·82	1018·22	
„ 14	5 12	1049	197·22	1129·04	
„ 15	17	1045	168·30	1130·89	
„ 16	3 16	1044	175·32	1172·41	
„ 17	2 4	1042	157·62	906·32	In disease, temperature rising 13th Dec. Died 19th Dec.
„ 18	3 11	1034	85·03	1568·31	
„ 19	7 7	1024	100·80	2042·31	
„ —	—	1022	124·47	—	

Examination of Urine, Table III.

Urine of Cow No. 5, in disease.

Date.	Quantities in 24 Hours.	Specific Gravity.	Degree of Alkaline Reaction.	Urea in 24 Hours.	Observation.
Dec.	pints. oz.				
17 to 18	11 0	1025	105·18	1754·76	
18 „ 19	8 1	1020	96·42	1220·75	
19 „ 20	8 3	1023	70·13	2021·75	
20 „ 21	7 0	1018	61·37	1423·55	
Morn. to even. 21 „ 21	- - -	1016	52·59	(58·73 in 1 pint.)	
Urine extracted from bladder.	- - -	1020	neutral	- -	Died night of 21st Dec.

Examination of Urine, Table IV.

Average Results.

—		Specific Gravity.	Degree of Alkaline Reaction.	Urea in 24 Hours.
Cow No. 6, inoculated, recovered.	In health -	1046	153·80	1487·4
	During acute stage.	1042	198·88	2197·5
	During 1st stage recovery.	1039	171·13	1711
Bullock No. 3, diseased by infection, died.	In health	1050	188·75	1177
	In disease	1037	141·25	1325
Cow No. 5, diseased by infection, died.	Early symptoms to Death -	from 1025 to 1016	105·18 / 52·59	from 1st {from 1755 to 2022} to 2nd {from 2022 to 1423}
Specific gravity of urine found in bladder, 1020.				Average of the 4 observations, 1605·2 grns.

Part III.

Dr. Marcet. Report to Commissioners.

The Blood.

The first part of my report contained the analysis of the blood of a cow while in a sound state of health, while suffering from the plague, and while recovering from it. I have now to report the analysis of three more samples of blood; two of these were obtained from the same cow, viz., the first sample was drawn (on January 9th), in the very earliest period of the disease, and before any other symptom was exhibited except a rise in the animal's temperature; and the second sample was drawn (on the 13th January), at the time the animal was breathing its last; it was then laying down but not insensible. When bled the respiration was no more but a series of gasps; the jugular vein from deficiency of the heart's pressure could not be opened in the usual way, but had to be incised with a knife, and the blood was emitted very slowly, instead of pouring forth in a full jet as usual. Respiration stopped while the blood was being drawn, and the last quantity trickled out under the influence of artificial pressure on the chest and abdomen; but very little (perhaps two or three ounces only) could be obtained after the animal had ceased breathing.

The analysis of the sample of blood, drawn first from the animal (on January 9th), may be assumed as showing the composition of this fluid in the very earliest stage of the disease; it is as follows:—

Blood drawn on the 9th January 1866.

Analysis No. V.

In the earliest period of disease (first stage).

Water - - -	854·7	
Albumen - - -	125·2	137·8
Fibrin - - -	4·8	
Mineral constituents -	7·8	
	992·5	
Solid constituents - -	145·3	
	137·8	
Extractive matters - -	7·5	
Specific gravity of blood - -	1039	

Blood drawn on the 13th January 1866.

Analysis No. VI.

The animal dying (second stage).

Water - - -	813·4	
Albumen - -	161·8	176·5
Fibrin - - -	5·5	
Mineral constituents -	9·2	
	989·9	
Solid constituents - -	186·6	
	176·5	
Extractive matters - -	10·1	
Specific gravity of blood - -	1048	

The only marked difference found to exist between these two samples of blood is due to the proportion of water in the blood drawn first (854·7) being greater than that of the blood drawn last (813·4), or when

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the animal was dying. This accounts for the albumen, fibrin, mineral constituents, and extractive matters, and for the specific gravity, being higher in the second than in the first analysis.

In the next analysis, No. VII., the blood was taken from a diseased cow on the 25th January. The animal showed the first visible signs of disease on the morning of the 24th January; the temperature of the animal may be assumed as having commenced rising some time previously, and consequently the cow may be considered in the second stage of the disease. The coagulation of the blood commenced four minutes after being drawn, four minutes later it was gelatinous throughout, and the coagulation was complete 10 or 11 minutes after the operation.

Blood drawn on the 25th January 1866.

Analysis No. VII.

Second stage of disease.

Water	787·2	
Albumen	195·0	
Fibrin	5·7	208·5
Mineral constituents	7·8	
	995·7	
Solid constituents	212·8	
	208·5	
Extractive matters	4·3	
Specific gravity of blood	1059	

In order to draw conclusions from this analysis, we may compare it with the average composition of the two samples of healthy blood (Analysis No. I. and No. II), which is as follows:—

Water	831·2	
Albumen	144·3	
Fibrin	3·45	155·75
Mineral constituents	8·0	
	986·95	
Solid constituents	168·8	
	155·75	
Extractive matters	13·05*	

If the results of the analysis No. VII. be now considered together with the average composition found for blood in health, it will be seen that the blood from the animal in the second stage of disease contained less water (787·2 instead of 831·2), and consequently a greater proportion of solid constituents (212·8 instead of 168·8), than healthy blood. The albumen, which forms the bulk of the solid constituents, is, as may be expected, increased in the blood of analysis No. VII. The fibrin is considerably higher in the blood, drawn in the second stage of the disease (5·7 per thousand), than in healthy blood (3·45), and this excess is larger than could be accounted for by the diminution of the water. Therefore the final result of analysis No. VII. is to show that this blood, which had belonged to an animal in the second stage of the disease, was less watery and contained more fibrin than healthy blood.

The following and last series includes the analysis of the blood of a heifer in health and disease; the first sample being drawn on the 14th February (Analysis No. VIII), and the second on the 23rd February (Analysis No. IX).

Blood drawn on the 14th February.

Analysis No. VIII.

In health.

Water	830·5	
Albumen	148·5	
Fibrin	4·9	161·5 Chloride
Mineral constituents	8·1	Sodium,
	992·0	
Solid constituents	169·5	
	161·5	
Extractive matters	8·0	
Specific gravity	1047	

Blood drawn on the 23rd February.

Analysis No. IX.

In disease (second stage).

Water	811·3	
Albumen	162·9	
Fibrin	7·7	178·4 Chloride
Mineral constituents	7·8	Sodium, 4·
	989·7	
Solid constituents	188·7	
	178·4	
Extractive matters	10·3	
Specific gravity	1054	

At the time the second sample of blood was drawn the heifer had refused taking food for three or four days, had been purging for two days, but mostly during the last twenty-four hours, was much inclined to lay down, respiration spasmodic, and gums red and erythematous.

The first signs of coagulation appeared three minutes after the blood had been drawn; four minutes later it assumed a thickened consistence, and was entirely coagulated eleven minutes after venæ sectio.

I have precisely the same remarks to offer with reference to the comparative composition of these two samples of blood as in the former cases, viz.:—The water is less in the diseased than in the healthy blood, and there is consequently an apparent general increase of solid constituents; the fibrin, however, is higher than might be accounted for by the reduction of the proportion of water, being 7·7 in the diseased blood and 4·9 in the healthy blood. The chlorine, calculated as chloride of sodium, was determined in both these samples of blood; the difference between the two results is but slight, and merely shows that there is rather an increase than a deficiency of chlorine or chloride of sodium in diseased blood.

Examination of the Urine.

I have two more analyses of urine to report. The results have been disposed in the form of tables, headed Examination of Urine, Table V. and VI., which are constructed on the same plan as those in Part II. of this report, with the difference that the column "degree of alkaline reaction" is omitted.

I have also introduced another table, Table VII., showing the average results obtained from the five analyses of urine. In this table I have not stated the degrees of alkaline reaction, which, although believed to be correct, may be liable to error from the method adopted for the collection of the urine. This average statement will be found to contain the average quantities of urine passed in health and disease, the average specific gravity in health and disease, the average amount of urea passed per 24 hours in health and disease, and the average proportion of mineral matters, also in health and disease.

* As this report was going to press I introduced analyses Nos. VIII. and IX., which had just been completed. The composition of this last sample of healthy blood varies but slightly from the average of analyses Nos. I. and II. of healthy blood; the proportion of fibrin being, however, somewhat higher in analysis Nos. VIII. than in the average of analyses Nos. I. and II.

Examination of Urine, Table V.

ine of Heifer No. 7, in Health and Disease.

Quantities in 24 Hours.	Specific Gravity.	Urea in 24 Hours.	Observations.
pints. oz.		grains.	
4 10	1045	1153·7	
2 10	1050	682·5	
2 15½	1048	684·7	
9 10	1019	1169·6	Mineral constituents 16·65 per 1000, or 1334 grains in 24 hours.
10 0	1018	1207·5	
4 18	1042	823·2	
3 10	1043	539·0	
3 13½	1033	633·5	
6 0	1028	934·5	Mineral constituents 22·72 per 1000, or 1192·8 grains in 24 hours.
2 18	1043	715·6	
3 14	1051	812·6	
7 15	1026	1044·3	Temperature first observed to rise on the 10th Jan. at 8 p.m.
3 16	1044	904·4	
2 17½	1045	878·4	Mineral constituents 35·7 per 1000, or 898·1 grains in 24 hours.
2 1	1038	669·1	
3 18	1035	1764·3	
1 3	1017	117·2	Mineral constituents 13·1 per 1000, or 131·8 grains in 24 hours.
—	1025	442·7 per pint.	Died on the 16th.

Examination of Urine, Table VI.

Urine of Heifer, No. 12 in Disease.

ys.	Quantities in 24 Hours.	Specific Gravity.	Urea in 24 Hours.	Urea in 100 parts Urine.	Observations.
even.	pints. oz.		grains.		
13	6 12½	1027	1588·3	3·74	Temperature first observed to increase on the 10th Jan. 8 p.m.
14	2 10	1030	923·1	4·22	
15	2 10	1025	890·3	4·07	
16	1 10	1029	525·0	4·00	Temperature falling.
17	1 16	1028	544·9	3·46	Found dead on the morning of the 18th Jan.

Examination of Urine, Table VII.

Total average Results.

	Quantities in 24 Hours.	Specific Gravity.	Urea in 24 Hours.	Mineral Constituents in 24 Hours.
	pints. oz.		grains.	grains.
No. 6, ated, ired. — In health	8 5	1046	1487·4	3440
No. 6, ated, ired. — During acute stage.	8 19	1042	2197·5	1865
No. 6, ated, ired. — During 1st stage recovery.	6 15	1039	1711·0	
CK, No. 3. ased by tion, died. — In health	5 4	1050	1177·0	
CK, No. 3. ased by tion, died. — In disease	4 11	1037	1325·0	
R, No. 7, d by in- n, died. — In health	4 18	1038	850·6	1288
R, No. 7, d by in- n, died. — In disease	3 12	1033	896·3	515
No. 5, ed by ion, d. — Early symptoms	from 11 0	from 1025	from 1st { from 1755 to 2022	
No. 5, ed by ion, d. — to Death	to 7 0	to 1016	to 2nd { from 2022 to 1423	
	Average of the 4 observations 8 11		Average of the 4 observations 1605·2	
R, No. 12, sed by in- on, died. — In disease	3 0	1028	894·4	

Examination of Urine of Heifer No. 7.

The average results of the analysis of the urine of heifer No. 7 may be at once ascertained by an inspection of Table VII., above, when it will be observed that the quantity of urine voided by the animal in health (4 pints, 18 oz.) was considerably larger than in disease (3 pints, 12 oz.). The specific gravity of the urine of the healthy animal (1038) was in excess of that voided in disease (1033). 5·37 per cent. more urea was passed by the heifer in disease than in health; and the average amount of mineral constituents was found to be much less in the diseased than in the healthy animal, by the proportion of no less than 60 per cent. The average diminution of the specific gravity appears due to the falling off of the mineral constituents (from 1288 to 515), and it would probably have been greater but for the increased proportion of urea.

On considering the individual results of the daily examination of the urine of heifer No. 7 it will be observed that the amount of urea contained in the urinary secretion voided from the 14th to the 15th January had risen suddenly (from 669·1 grains the day before) to 1764·3 grains; this is remarkable as having occurred the day previous to the animal's death, and consequently when its vital functions may be considered as greatly weakened.

Examination of Urine of Heifer No. 12.

The urine in this case was only examined on five successive days; the animal was ill when the inquiry was commenced, and died the day after that on which the urine was last submitted to examination. From the absence of any observation as to the composition of this urine in health, it is not possible in the present case to take average statements into consideration. By an inspection of "Examination of Urine, Table VI.," it will be observed that the secretion of urine diminished at a very remarkable rate, falling gradually from 6 pints 12½ oz. to 1 pint 16 oz. in the course of the last five days. In this case the specific gravity of the urine remained nearly the same throughout the five days on which it was examined, apparently because the reduction in the excretion of the mineral constituents of the urine may be considered to have kept pace with the falling off in quantity of the secretion. The total quantity of urea was reduced as the animal became worse, which is not in accordance with the preceding results (with the exception of the falling off of the urea in the last day of heifer No. 7's life); this discrepancy is, however, but apparent, for it must be due rather to there not being water enough secreted to carry off the whole of the urea formed in the body, than to a diminution in the formation of urea in the body; this will be readily understood if it be considered that the per-centage of urea in the urine of heifer No. 12 was found to be much higher than in health, varying from 4·22 to 2·74, and amounting on an average to 3·70, while the average per-centage of urea in the healthy urine of heifer No. 7 was 2·00.

Before concluding this part of my report, I must explain that my attention has been directed to the detection of the presence of albumen in the urine of animals suffering from the plague. I have stated that from the impossibility of being certain that the urine collected on the floor of the stalls was entirely free from intestinal evacuations, I could not venture upon relying implicitly on the results of this inquiry, as the presence of albumen might be considered as due to small quantities of fœcal matters, washed by the urine into the trough disposed to receive it. I had hoped to be able to devise some plan of collecting the urine voided every 24 hours by the animals under observation, which would not be open to this objection, but was prevented from thus renewing the inquiry from the time allotted to me to conclude this report.

I have been able in a few cases, only, to submit to examination for albumen, urine which had not been collected on the floor of the stall; these cases are as follows:—

A sample of urine, kindly sent me on the 15th

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December from the Royal Veterinary College by Mr. Pritchard, and taken from a calf that had died of the plague that morning, contained a tolerably large quantity of albumen. The reaction of this urine was not acid, although blue paper was somewhat discoloured by it. It turned red litmus paper blue, and turmeric paper brown.

The urine of heifer No. 7, extracted from the animal's bladder after death was examined and found highly albuminous.

Urine taken on the 20th December from the bladder of a bullock, which had died of the plague at the Albert Veterinary College, was found to contain a tolerably large quantity of albumen. This urine emitted an unpleasant smell, but reacted weakly acid.

A sample of urine obtained from the bladder of a heifer that had died of the plague on the 13th January, at the Albert Veterinary College, was found on examination to be albuminous inasmuch as it gave an abundant precipitate with nitric acid, insoluble in ether and coagulated under the influence of heat. In this case acetic acid produced a muddiness in the cold fluid, a phenomenon which I have occasionally witnessed, although difficult to explain. This urine was alkaline.

The urine of cow No. 5, extracted from the bladder after death, was found to be albuminous.

Although in the above cases of urine examined for albumen after death, albumen was found, I am not prepared to assert positively that the presence of this substance in the urinary secretion was due to the disease, as it might be owing to the action of the urine on the mucous membrane of the bladder after death. I have, however, tested so frequently for albumen the urine which had been collected in the troughs, that I feel assured this substance is at least occasionally present in the urinary secretion of animals suffering from the cattle plague; for instance I may be allowed to state that I examined daily for albumen the urine of heifer No. 7, collected in one of the troughs. The positive presence of albumen could not be detected in the urine passed in the first 13 days, but on the third day after the temperature of the animal had began rising, a trace of albumen was decidedly present in it; the next day it contained more albumen, which continued being present until the day of the animal's death, when the urine voided was still more albuminous. It is impossible to believe that the albumen was, in this case, derived from fœcal matters accidentally washed into the trough, rather than admit that its presence was due to the disease.

The Milk.

I have to report the examination of the milk of cow No. 6, from the 20th November to the 12th December 1865. This cow was inoculated with the plague virus on the 1st December; three days later it exhibited the first symptoms of the disease, which increased in urgency till the 7th December, and then gradually subsided.

The results are arranged in the form of a table divided into six columns, each of which are headed as follows:—Dates, Quantities in 24 Hours, Specific Gravity, Fats, Casein, and Mineral Constituents.

The fatty matters of the milk were determined by evaporating to dryness a certain quantity of the fluid with a known weight of sulphate of lime, and then exhausting the residue with ether; the fats were obtained from the ethereal solution by distilling off the ether and drying the residue till it ceased to lose weight. The casein was determined in the residue, containing sulphate of lime, which had been exhausted with ether. For this purpose the sugar of milk was first removed by washing the residue with dilute alcohol, and finally the sulphate of lime and casein were again dried and weighed together; by subtracting from this mass the known weight of the sulphate of lime, that of the casein was obtained. The proportions of mineral constituents were ascertained by evaporating to dryness a certain bulk of the milk and incinerating the residue. The process just described is that recommended by Lehmann as the best known for the analysis of milk. It necessarily requires some time to be properly carried out, in consequence of which, the fats, casein, and mineral constituents could only be determined every other day, or five times before the animal was inoculated, and four times after it had been inoculated. On every occasion the sample analysed was taken from the milk secreted in 24 hours.

The cow was inoculated on the 1st December, but the first symptoms only showed themselves on the 4th. I shall therefore propose to consider as milk obtained from the healthy animal that drawn from the 20th November to the 3rd December, and as milk yielded by the diseased animal that obtained from the 3rd to the 12th December. The average quantity of milk the cow gave daily before falling ill was 7 pints 3 oz., and while suffering from the disease 4 pints 13 oz.; she consequently yielded on an average 2 pints and 10 oz. less milk while ill than she did in good health.

The average daily specific gravity of the milk in health—1034, was higher than that of the milk obtained from the cow when ill—1030; this is obviously due to the milk from the diseased cow containing more water than that of the healthy animal. It will be observed that from the 7th to the 10th, when the animal was very ill, the specific gravity of the milk fell gradually from 1034 to 1026. During the same time the proportion of fats increased from between 6·17 and 7·04 to 10.

The average proportion of fatty matters is much greater in the milk of the animal suffering from the plague, 7·55, than in that given while in good health, 5·73.

The proportion of casein contained in the milk was nearly the same while the animal was in good health and after it had fallen ill, the average proportion in health being 7·01 per cent., and for disease 6·84 per cent.

Finally, the milk given in health contained on an average rather more mineral salts, 0·82 per cent., than that secreted in the diseased state, 0·62 per cent., the difference amounting to 20 per cent.

Consequently, the main difference between the milk secreted by animals in health and by the same animal when suffering from the plague is to be found in the reduction of the total quantity of milk secreted, the increase in the proportion of fatty matters, and a slight decrease in that of the mineral constituents.

Analysis of Milk. Cow, No. 6.

Dates.	Quantities in 24 hours.	Specific Gravity.	In 100 Parts.		
			Fats.	Casein.	Mineral Constituents.
	pints. oz.				
20 to 21 Nov.	8 0	1032	6·52	8·12	—
21 to 22 „	8 10	1032	—	—	—
22 to 23 „	7 9½	1036	5·60	6·75	0·81
23 to 24 „	6 0	1034	—	—	—
24 to 25 „	6 13	1034	5·58	6·03	0·72
25 to 26 „	6 15	1036	—	—	—
26 to 27 „	7 10	1034	5·61	6·87	0·77
28 to 29 „	7 4	1034	—	—	—
29 to 30 „	7 12	1033	—	—	—
30 to 1 Dec.	7 10	1036	5·18	6·09	1·03
1 to 2 „	6 1	1037	—	—	—
2 to 3 „	6 15	1035	5·88	8·19	0·79
3 to 4 „	7 4	1032	—	—	—*
5 to 6 „	6 11	1033	6·17	7·99	0·66
6 to 7 „	5 2	1034	—	—	—
7 to 8 „	4 7	1030	7·04	6·46	0·45
8 to 9 „	2 14	1027	—	—	—
9 to 10 „	2 8	1026	10·57	6·96	0·68
10 to 11 „	4 5	1031	—	—	—
11 to 12 „	4 14	1032	6·41	5·94	0·69

* First symptoms.

The Bile.

Five samples of bile obtained from animals which had died of the plague were submitted to analysis, for the determination of the water, solid constituents, and mineral salts they contained. One analysis of the bile of a cow, slaughtered in health, was also made in order to obtain a standard for comparison. I must premise that the composition of bile is in all probability subject to variations in health, and it is in no way remarkable that, although my results show healthy ox bile to

in 8·37 per cent. of solid constituents, Lehmann siological Chemistry, Vol. II.), should inform us Frerichs has found from 10 to 13 per cent. solid ituents in the biliary secretion. It is only in cases e a considerable difference is found between the osition of bile of bovine animals in health and e, that the morbid state can be considered as the of this change.

e following are the results of my inquiry on the osition of bile found in the gall-bladder of animals had died of the Cattle Plague :—

Examination of Bile.

	Bile in Health.	I. Cow, No. 5.	II. Heifer, No. 12.	III. Heifer.	IV. Heifer.	V. Heifer.
gravity	—	1015	—	—	1015	—
Water	91·63	91·83	94·28	94·53	94·18	94·14
olid constituents.	8·37	8·17	5·72	5·47	5·82	5·86
l matters olid constents.	1·28	1·10	1·05	1·05	1·07	1·10

the case of the four heifers, the composition of bile varied but very little, the average proportion olid residue amounting to 5·72 per cent., and the age proportion of mineral constituents to 1·07 per of the bile. In these four analyses the per-centage olid constituents is considerably below its proportion ealth, the per-centage of the mineral constituents is wise less in the diseased than healthy bile.

we now consider the average proportion of mineral ers in the solid constituents of the bile from the heifers, we shall find it amounting to 18·7 per , which is a higher proportion than that given ox-bile either by Berzelius 12·7, by Bensch 13·15 nmann, Physiological Chemistry), or by myself (see ysis) 15·3.

he composition of the bile of the *cow* that had died he disease was found very like that of healthy bile, consequently, out of five analyses of biliary secre- from diseased animals, four differed, as stated ve, with the analysis of healthy ox bile, and one ibited no difference worth taking into consideration.

Conclusions.

he conclusions from the whole of my inquiry on Chemical Pathology of the Cattle Plague, may be med up as follows :—

1*st. The Blood.*

lthough in the first or earliest stage of the disease *water* in the blood appears slightly increased, in the ond or last stage it is considerably diminished, viz., ·4 ; 787·2 and 811·3 instead of 831 (average of ee analysis) per 1,000 parts of blood in health.*

he falling off of the water and consequent increase solids in the blood establishes an interesting parallel ween cholera and the cattle plague. In cholera the er in the blood is known to diminish considerably. us it is observed by Dr. Garrod (London Journal of dicine, May 1849), that in his experiments he found numbers representing the total solids in the blood cholera patients to be 271 and 275·5, and that the portions of solid constituents in cholera blood ained by Dr. Parkes (reported in the same paper) re 270·93 and 251·54, while according to Becquerel l Rodier the maximum amount of solids in males s 240 and in females 227 parts in 1,000 of blood health. Lehmann states (Physiological Chemistry, . II. p. 243), "A decided and absolute *diminution f water* in the serum, and in the blood generally, "is in reality only observed in cholera ; on this "point all observers concur." There is one symptom exhibited in cholera and the cattle plague—I am referring to the diarrhœa—which, by causing a drain of water from the body, is probably the cause in both cases of the deficiency of water in the blood.

No conclusion can be obtained from the *albumen* determinations, as the amount of this substance in the blood appears to rise and fall as the water decreases or increases. In one case, only, the proportion of albumen was considerably above the normal standard.

The proportion of *fibrin* in the blood of bovine animals suffering from the plague is invariably higher than that found in healthy blood of animals of the same tribe. 1000 parts of ox-blood in health, obtained from the external jugular vein, were found to contain 3·93 parts (average of three analyses), of fibrin, while 1000 parts of blood from the same vein of diseased animals contained respectively in six analyses, 6·4, 5·0, 4·8, 5·5, 5·7, and 7·7 parts of fibrin, the average excess being 1·92 per thousand, or 50 per cent. of the fibrin. This increase of fibrin was very probably owing to the nature of the disease, but it has been shown that the blood of animals in a state of starvation contains more fibrin than normally, thus according to experiments of Franz Simon, when dealing with diseased horses, many of them meagre and half starved, the proportion of fibrin increased from 4 parts to 11 or 12 in 1000 (General Pathology by John Simon, p. 50). It might be, therefore, inferred that the increase of fibrin in cattle-plague blood was due to the animal refusing its food ; this view, however, can hardly be entertained, if it be considered that in the case of analysis of blood No. V., according to notes taken at the time, the animal, when bled, showed no other sign of disease but a rise in the temperature ; it was feeding well and exhibited no eruption, proving that in this instance, at least, the increase of fibrin in the blood was not due to a state of inanition.

If it be admitted that the excess of fibrin in the blood of animals suffering from the plague is due to the disease, this circumstance would appear to show some similarity between the cattle plague and erysipelas, in which case the fibrin in the blood is known to be considerably increased beyond the normal standard.

The proportion of *mineral constituents* of the blood of animals suffering from the plague was found nearly the same as that of healthy blood, and consequently no inference can be deduced from this part of the inquiry.

2*nd. The Muscular Tissue.*

The results given in Part I. of the present report may be summed up, as follows :—

1. That diseased ox-flesh contains more soluble albumen than healthy ox-flesh.

2. That the rate of diffusion of albumen throughout diseased ox-flesh is slower than through healthy flesh.

The excess of soluble albumen may be considered either as due to a process of solution, or albuminous degeneration, of the muscular tissue ; or to an increased supply of albumen to the muscle from the blood.

At all events, as previously stated, the results from this part of the inquiry show that, in the disease under our consideration, the nutrition of muscular tissue no longer takes place as it does in health.

3*rd. The Urine.*

The most striking result obtained from the investigation of the comparative composition of urine of bovine animals in health and (cattle plague) disease is the increase of *urea* which invariably occurs as one of the first symptoms, and about the same time (on an average 24 hours before, according to Dr. Sanderson) as the temperature of the animal begins to rise. This secretion of urea becomes more and more excessive as the temperature of the animal continues rising, but when very little urine is secreted towards the termination of the disease, the excess in the total secretion of urea in 24 hours may begin to fall off, although the per-centage proportion of urea in the fluid undergoes but little

* In analyses of blood, Nos. III. and IV., the animal having ntracted the disease by inoculation, from which it finally overed, the illness may be considered as never having pro- ded beyond the first stage, which accounts for the water ng rather above than below its normal proportion.

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alteration. Table VII. (examination of urine), containing the total average results of the five series of analyses of urine, shows the correctness of the above statement, the per-centage increase being for—

Cow No. 6 - 48 per cent. (The excess of urea diminished to 15 per cent. during the period of recovery.)
Bullock No. 3 12 „
Heifer No. 7 5 „
Cow No. 5 15 „
Heifer No. 12 5 „—(Taking the amount of urea secreted by heifer No. 7 in health as a standard for comparison.)

Certain diseases in the human subject are likewise known to be attended with an increased excretion of the urea in the urine; thus we find it stated by Dr. E. A. Parkes (The Composition of Urine in Health and Disease, p. 245), that the proportion of urea in urine is increased in typhoid fever beyond the physiological standard, and descends below it in convalescence; but the most interesting remark in Dr. Parkes's book, which may be considered as connected with our subject, applies to the inquiries of Mr. Sidney Ringer, who in an elaborate paper (Med.-Chir. Trans. 1859) has indicated in ague a very close connexion between the temperature of the body and the amount of urea excreted, the variations of the urea and temperature observing a remarkable uniformity. The increased simultaneous secretion of urea and rise of temperature in the case of the cattle plague (the temperatures have been carefully determined by Dr. Sanderson) establishes a very remarkable connexion between the cattle plague and fevers.

The total average amount of urine secreted, in 24 hours, does not undergo a marked change in disease; in one case it was slightly increased, and in two slightly diminished.

The *specific gravity* of the urine is found to fall as the animals become worse; this is obviously due to the *mineral constituents* of the urine, the proportion of which diminishes rapidly as the symptoms increase in urgency. I am informed by Professor Duguid, of the Albert Veterinary College, for whose valuable assistance throughout my inquiry I cannot sufficiently express my thanks, that he has observed animals suffering from the cattle plague to drink some, although very little, water after they begin to lose appetite; they generally take a mouthful or two when it is offered, but never anything like the usual quantity. Therefore diseased animals continue drinking a little water, although they take no solid food, and this might account for the amount of water being, relatively to the mineral constituents, greater in the urine of diseased than of healthy animals.

4th. The Milk.

The *quantity* of milk secreted, so far as we can infer from one series of observations, diminishes rapidly under the influence of the disease, its *specific gravity* falls, and at the same time it becomes richer in *fatty matters*, while the proportion of *casein* undergoes no material change; the mineral constituents are slightly reduced in disease.

5th. The Bile.

I have had time to make but a limited number of experiments on the composition of the bile of animals that had died of the cattle plague. They appear to show that this secretion, in disease, contains more water than in health, and that the proportion of *mineral matters* in the total solid residue of diseased bile is greater than in the healthy secretion.

The bile of animals that had died of the disease appeared particularly subject to decomposition, and even the day after death emitted a very offensive smell, assuming a yellowish-brown colour.

The question as to the presence or absence of albumen in the urine of animals suffering from the plague cannot be considered as solved in the pres report. Had time been allowed for the continua of these researches, I trust I would have been a to set this point at rest, having succeeded, at l after many failures, in devising a contrivance wh will allow of the collection of the urine voided 24 hours, without its coming in contact with the fl of the stall; should the presence of albumen in diseased urine be confirmed, an inquiry as to period of its existence therein would yield interest results. The new method for collecting the ur would have enabled me also to determine with certai the degree of reaction of the urine voided ev 24 hours. These results could not have failed to h been of much interest, probably in their connexion w the experiments of Dr. Bence Jones on the reaction urine. I had also proposed to institute a microscopi investigation of the urine, and a series of experime on the action of air and gases on the blood of anim dying of the plague; but from the limited time allow these researches could not possibly be carried out.

Finally, I may be allowed to state that I Arthur Gamgee has undertaken an importa series of inquiries on the chemical changes whi occur in the fluids of bovine animals suffering fr the cattle plague.* He analysed eight samples blood. The three first were taken from a calf perfect health, when very ill, and after recovering the two second from a cow suffering from the disea and after complete recovery; the two next from a animal during disease and after recovery, and the la from a calf a few minutes before death.

According to these analyses the proportion of wat in the blood of diseased animals is less than in healt the proportion of fibrin is greater in diseased tha healthy blood, the increase being conspicuous mo especially in severe cases, and the solid matters of t serum are generally diminished.

The diminished proportion of water in the bloo and its increase in the serum appear to show a d minished proportion of water in the blood globule and consequently an increase of corpuscles or of the solid constituents. If the precise relation between t proportion of water in the serum and in the corpuscl of the blood could be accurately ascertained, the pr portion of corpuscles in a given quantity of bloo might be determined without difficulty, but this can not be done, and hence the uncertainty of Becquer and Rodier's method of analysis, which has bee adopted in the present case.

It is for want of a reliable method that I have no undertaken the determination of the corpuscles in th samples of blood I analysed.

Seven specimens of milk were analysed (five analyse reported in Professor Gamgee's book); in none o these (seven) cases had the disease advanced to a remarkable extent, yet in all the secretion of milk wa almost entirely arrested. Dr. Gamgee states; "The changes in the constitution of the milk are very uniform and very marked."

"They appear to be the following:

"1st. The amount of sugar of milk is remarkably diminished.

"2nd. The amount of butter is (except perhaps at the commencement) enormously increased.

"3rd. The salts are slightly increased.

"4th. The caseine appears to be generally increased."

In my analysis of healthy and diseased milk, *obtained from the same animal*, the falling off in disease of the quantity secreted and the increase in the amount of butter (determined as fatty matters) were also observed. I failed, however, to notice a higher proportion of the casein.

There is this difference in Dr. Gamgee's process and mine, that he analysed the milk from different animals suffering from the disease, comparing his results with a standard analysis of healthy milk, while

* "The Cattle Plague," by John Gamgee, p. 70.

analysed the milk from the same animal in health nd disease, by this means avoiding the error which ay so easily arise from the difference in the physio- gical condition of different animals.

Dr. Gamgee states, respecting his investigation of he urine, that he could not obtain the total quantity f the secretion passed in 24 hours, and consequently ad not the opportunity of making as satisfactory an xamination of this secretion as he could have wished. Ie found it in rinderpest to be sometimes of acid, ometimes of alkaline reaction, its density varying onsiderably. He observed it to contain frequently mall quantities of blood and sometimes renal epithe- um ; in two cases there was a considerable deposit f bladder epithelium. The presence of albumen was etected in every sample of urine he examined, these amples being, I understand, extracted from the bladder fter death. He observes "that the amount of urea varied in various cases, but was not noticed to be "remarkably deficient ;" when the specific gravity was high the amount of urea was large. Dr. Gamgee states that bile-colouring matter was present in many of the samples of urine he examined, the amount "being so large often as to give the deepest green "colour to the urine ;" in one case, he adds, that he separated traces of bile acid.

These results, from the examination of urine, cannot well be compared with mine, as they do not apply to the fluid voided in 24 hours. The remark I have offered respecting the *albumen* present in the urine I examined, extracted from the bladders of animals which had died of the disease, refers equally to Dr. Gamgee's cases, namely, that this substance may be derived from the bladder after death, and not be due to the disease.

W. Marcet.

15th March 1866.

Note.—On the Composition of the Urine of Animals suffering from the Cattle Plague.

I have stated in my report that the question as to the presence or absence of albumen in the urine of animals suffering from the cattle plague had not yet been settled, the detection of this substance in the urinary secretion extracted from the bladder of the diseased animals, after death, being no positive indication that albumen is excreted by the kidneys, its presence in these samples of urine being possibly due to the action of the fluid on the bladder after death. I also remarked, that should the excretion of albumen by the kidneys in the cattle plague be confirmed, it would be interesting to institute an inquiry into the period during which this process takes place. The great difficulty to overcome in this investigation was the adoption of a method which would allow of the collection of the urine voided in 24 hours, without its becoming soiled with the fæcal matters of the animals. I succeeded in attaining this object by using a leather bag, glazed inside, and so constructed as to resemble a bladder, half of which would have been turned in; the upper part of the bag was, therefore, concave, so as to adapt itself to a bullock's abdomen, and act as a funnel to collect the urine, in other respects the bag was convex, and an opening in the centre of the funnel-shaped part of this receiver allowed the urine to flow into it. By means of a valve, with which the aperture was supplied, the fluid was prevented from escaping from the bag, even when subjected to some degree of pressure. In the upper part of the bag there was an opening closing with a stopper, through which the contents of the bag could be poured out; it might hold about a gallon of liquid when full. I had two of these instruments made, in order to be able to carry on my experiments with two animals at the same time. During this inquiry the bags, which were fastened to the animals by means of straps, answered well, although not so perfectly as could have been desired, as I am told that occasionally some loss of urine occurred when the animals were lying down; this, however, was not sufficient to interfere materially with the correctness of the results, as it should be borne in mind that the main object of these observations was not to ascertain the total quantity of albumen or other constituents in the urine voided every 24 hours, and, consequently, a slight loss of fluid could really not detract from the value of the inquiry. The investigation was carried out with two one year old bullocks, which were both kindly kept for me in the stables of the Albert Veterinary College. The bags were emptied two or three times a day, and occasionally rinsed out with water; the urine voided in 24 hours, by each animal, being collected in separate vessels. Mr. Duguid obliged me by measuring it every day, and sending me a sample of the fluid for examination.

The specific gravity of the urine, its reaction, and the urea and mineral constituents it contained, were determined in the same way as previously, the amount of chlorine in the ash was also ascertained. The examination for albumen, although usually a very simple process, had to be done with particular care on account of the frequent precipitation of hippuric acid on testing the urine with nitric acid. This required the addition of ether to the mixture, when the hippuric acid was entirely dissolved, any albumen present appearing as a cloud or muddiness in the fluid. In cases where it contained but a trace of albumen, the addition of ether, besides causing the hippuric acid to dissolve, had the advantage of assisting in the precipitation of the substance; by agitating violently the mixture of urine, nitric acid, and ether, and then allowing it to remain undisturbed for a minute, the ether was observed to rise to the surface, exhibiting a slight but distinct turbidity, and gradually a pellicle like a network could be distinctly visible in the ether. In order to make certain of the accuracy of the test, I took a sample of healthy human urine and shook it in a test tube with nitric acid and ether, but no pellicle formed in the ether, which remained perfectly clear. I then added a large amount of water to a few drops of blood, and mixed a little of this fluid with a sample of the healthy human urine, which now yielded a faint haziness when tested with nitric acid. This was now shaken with ether in a test tube, when the ether, on rising to the surface, was observed to exhibit precisely the same kind of pellicle as the bullocks' urine when treated in a similar way.

Urine of Bullock No. 22.

These observations were begun on the 14th of March, the bullock being then in perfect health. On the 4th of April the temperature of the animal was 1·054°, having risen 2 degrees from the previous day, and the animal may then be considered as infected. On the 5th of April it was still feeding, and was observed ruminating several times, fæces alkaline, tendency to constipation. On the 6th it is not feeding so well, fæces of normal consistence. On the 7th of April it is taking very little food and getting weak, fæces alkaline, tendency to constipation. The next day the animal was not feeding, the fæces becoming softer. Diarrhœa set in on the 9th, fetid fæces, animal lying stretched out, rolls over occasionally, and tries to get up but falls, is shivering, discharge from eyes and nose alkaline; died during the night. Weight after death, 321 lbs; loss, 60 lbs.*

The average daily quantity of urine voided by the animal in health was 3 pints 5 ounces, and 3 pints 6 ounces in disease; or very nearly the same in both cases, a result which agrees tolerably well with those formerly obtained.

The average daily specific gravity of the urine in health, 1,043, is a little higher than in disease, 1,038, a result in accordance with my former inquiries; the sudden reduction of the specific gravity to 1,024 and 1,028 on the last two days is worth noticing.

The average reaction of the urine was alkaline, as on former occasions; its degree being indicated by 204·11, which is the number of grains of oxalic acid necessary to neutralize one pint of urine in health, and 278·7 grains in disease, or rather higher in disease than in health; this is an unexpected result, as from the falling off of the mineral constituents of the urine the reverse might have been anticipated. Moreover Dr. Bence Jones has shown (Phil. Trans. v. 139) that during the period of fasting the urine of a healthy individual is the most acid, and during digestion the least so. Again the urine of carnivorous animals is generally acid, and diseased bovine animals taking no food, and consequently living as it were upon their own tissues, might have been expected to pass acid urine, or at all events urine less alkaline than in health.

The urea was on an average, as in the former cases, higher in the urine voided by the diseased animals than by the animals in health, the daily amount being 763 grains in health and 918·5 grains in disease, equal to an increase of 20 per cent. of the urea in health, confirming my former results.

* I am indebted to Professor Duguid's kindness for the above observations.

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The per-centage of urea was also higher in the diseased than in the healthy urine, viz., 3·17 and 2·92.

The mineral constituents exhibited the same alterations as on former occasions, namely a reduction in the urine of the diseased animal. These constituents will be observed falling off from 4·31 per cent. to 1·30 per cent. and in the whole 24 hours urine from 1,268 grains to 136·5 grains. The chlorine in the diseased animal's urine fell at a more rapid rate than the total mineral constituents, the last quantity voided, which measured 1 pint 4 oz., only containing 7·8 grains of chlorine. This fact might have been anticipated, as I have shown in my report that the blood of diseased animals undergoes no loss of chlorine, and as none can be obtained from food, it is obvious there must be less and less of this substance in the animal's urine after it has refused feeding.

The final remarks apply to the presence of albumen in this urine. I generally observed in the healthy urine a trace of this substance, inasmuch as nitric acid produced in it a faint haziness, and after shaking with ether a distinct albuminous film appeared; with acetic acid and the application of heat I could obtain a haziness only in a few cases. I need not add that the urine was invariably filtered before being tested, when it became perfectly clear. The temperature of the animal first began distinctly to rise on the 4th of April, and on this day there was but the normal faint trace of albumen in the urine, but on the 5th or next day the urine contained a decidedly increased quantity of this substance; the proportions of albumen in the 24 hours' secretion were as follows:—

On the 6th	-	0·044 per cent.
7th	-	0·144 „
8th	-	0·246 „
9th	-	0·440 „

Therefore, in this case, where no albumen could accidentally have found its way into the urine, we find it present in abnormal quantity the day after the temperature has begun rising, its proportion increasing gradually until death; the last quantity of urine voided, and that taken from the bladder after death, being very albuminous.

Urine of Bullock No. 21.

The observations on this animal—also a one year old bullock—were begun on the 14th March, the animal being then in perfect health. The first positive rise in the animal's temperature took place on the afternoon of the 31st, when it was 104° F., having risen 1·4° since the morning, the animal may therefore be considered as first infected on that day; the bullock was then feeding well and ruminating, with a tendency to diarrhœa. On the 1st April the animal is still feeding and ruminating; *coughs occasionally*. 2nd April, fæces becoming more solid, reaction alkaline. 3rd April, very dull, stands hanging his head under the manger, not feeding—probably not feeding well yesterday, constipation. 4th April; shivering; not feeding; constipation. 5th April, not feeding; very dull; shivering; seems weak; lies a good deal, and very unwilling to rise; diarrhœa; fæces dark coloured. 6th April, excessive diarrhœa; fæces light coloured, very fetid, containing a large quantity of mucus and clots of blood; eats nothing; getting very weak; shivers; coughs occasionally, when disturbed; lies a good deal with head and legs stretched out. When lying a considerable quantity of the urine lost; legs and ears cold; mouth cold and clammy. On the morning of the 7th the animal seemed much the same as last night, fæces still of a very light colour, and fetid, but less fluid and no traces of blood. Was observed eating a little during the day; discharge from eyes and nose alkaline; very weak and unwilling to move; shivering. At 11.30 p.m. much the same; standing eating a little hay now and again. 8th April, diarrhœa continues; discharge from eyes and nose still alkaline. 9th April, animal much better; seems livelier and feeding well; diarrhœa. 10th, discharge from eyes and nose less abundant; diarrhœa continues; fæces at natural colour; eyes and nose clean. On the 11th April in the morning the animal was found dead in the stall.*

In the present case, the total quantity of urine voided by the bullock in health cannot well be compared with that passed by the diseased animal, as a good deal of the fluid accidentally escaped from the bag during the animal's illness. This circumstance will account for the total amount of urea excreted in 24 hours being less during the stage of disease than it had been in health. The percentage of urea in the urine of the diseased bullock, 3·25, is considerably higher than in health, 2·66, and as I have shown, from former observations, that the amount of urine voided by a diseased animal is very nearly (somewhat less) the same as passed by that animal when in health, it is very obvious that the falling off in the total quantity of urea, in this special case, is due to the accidental loss of urine.

The average daily specific gravity of the urine in health was 1051, and in disease 1037, being as in former cases less in disease than in health. As happened with the bullock, No. 22, there seems in the present instance a sudden falling off in the specific gravity of the urine shortly before the animal's death.

The average daily alkalinity of the urine in disease was 2797, and in health 1991, being, as in the last case, higher in disease than in health. We observe, however, a sudden reduction of alkalinity in the urine voided from 9th to 10th April, on the day before the animal died, and that removed from its bladder after death was acid.

I may take this opportunity to state, that I have on other occasions found the urine extracted from the bladder after death, from the present disease, to be acid.

The daily average percentage of mineral constituents in the urine voided by the diseased animal was 2·187, and by the bullock in health 3·556, this result being similar to that obtained formerly, namely, that the proportion of mineral constituents in diseased urine is lower than in that of healthy animals.

With respect to the chlorine contained in the urine in the present case, it was found to fall off very rapidly from the time the animal was taken ill, undergoing a reduction (from 0·479) to 0·328 per cent. of urine the day after albumen had first appeared in abnormal quantity in the secretion. In the course of seven days its proportion diminished at the following rate:—1st, from 0·328 to 0·076; 2nd, from 0·076 to 0·029; and, 3rd, from 0·029 to a mere trace. The average percentage in health being 0·580, and in disease 0·182. Should we now compare the proportion of chlorine in the present case with those found in the urine of bullock No. 22, we shall observe that the average daily percentage of this substance during disease (0·182) is much less than in No. 22 (0·398); it will also be seen that the chlorine undergoes a daily reduction much greater in No. 21 than in No. 22.

Taking into consideration the symptoms of this case, it appears very probable that animal No. 21 died actually from disease of the lungs, after having partly recovered from the cattle plague. The rapid falling off of the chlorine in the urine of this animal would be accounted for by assuming that it died from pneumonia, as it is well known that in this disease the urinary secretion loses in a great measure, and in some cases entirely, its chlorine. Thus it is stated by Dr. Parkes (The Composition of Urine, p. 275):

" The chloride of sodium is diminished or entirely absent
" during the early period at the commencement of hepa-
" tization (of the lungs), and reappears during, or rather
" after, resolution. This seems to be an almost invariable
" occurrence; at least very few exceptional cases have yet
" been recorded."

Faint traces of albumen, as in the preceding case, were found in the healthy urine on most days, but two days after the temperature had first risen, the presence of a larger quantity of albumen was observed. The proportion of this substance gradually increased day by day, until about the 6th or the 7th of April, when it apparently remained stationary, notwithstanding the remittance of the cattle plague symptoms, and the urine in the bladder after death was very albuminous. It is worth noticing that the amount of albumen in the urine of animal No. 21 was never nearly so great as in that of the animal No. 22, this last case being apparently a good illustration of genuine cattle plague.

Urine of Heifer No. 7.

I have stated in my report that the urine of heifer No. 7 had been found to contain albumen during the animal's illness. I now subjoin the table of the daily observations to which this fluid was submitted for the detection of this substance. The inquiry was commenced on the 27th of December and continued daily up to the 16th of January, when the animal died. On the 10th January its temperature began to rise, and on the 13th or the 3rd. day a marked trace of albumen was decidedly present in the urine; the proportion of this substance in the urinary secretion increased gradually till death, when the urine contained much more of it, and the fluid extracted from the bladder after death was found to be very albuminous. The results of the investigation respecting the presence of albumen in the urine of bullocks No. 22 and 21, where the secretion was collected directly from the animals, add greatly to the importance of the inquiry for the detection of albumen in urine of heifer No. 7, which was collected into a trough in connexion with the floor of the stall wherein the animal was kept, and where

* I am also indebted to Prof. Duguid for the above observations.

urine might have derived albumen from admixture
fæces. This case, taken by itself, would be of little
towards the solution of the question as to the presence
bumen in the urine of animals suffering from the cattle
ue; but it now confirms, in a remarkable way, the
lts derived from the inquiry instituted on the two
r animals. The presence of albumen in the urine ex-
ed from the bladder of animals after death from the
e plague, found by Dr. Gamgee, myself, and I have
loubt also by other observers, can now safely be con-
ed as due to the disease and not to a post-mortem
nomenon, thus confirming the results obtained from the
bullocks.

sample of urine from a very young calf (fed on milk)
n directly from the animal on the 19th April, the day
re it died of the plague, was found to be acid, and to
ain a little albumen; the urine extracted from the
der of this animal about an hour and a half after
h was acid, and decidedly though but slightly albu-
nus.

ALBUMEN in the URINE of HEIFER No. 7.

Date.	Observations.
865.	
26–27.	Albumen doubtful or absent.
27–28.	Albumen „
28–29.	Albumen „
30–31.	Albumen „
31– 1.	Albumen „
866.	
1– 2.	Albumen „
2– 3.	Albumen „
3– 4.	Albumen „
4– 5.	Albumen „

ALBUMEN in the URINE of HEIFER No. 7.

Date. 1866.	Observations.
Jan. 6– 7.	Albumen doubtful or absent.
„ 8– 9.	Albumen „
„ 10–11.	Albumen absent. Temp. began to rise 10th Jan., 8 p.m.
„ 11–12.	Albumen absent.
„ 12–13.	Trace of albumen decidedly present.
„ 13–14.	Albumen present.
„ 14–15.	Albumen „
15–16.	Albumen present in much larger quantity. Heifer died on evening, the 16th Jan.; urine extracted from the bladder after death very albuminous.

The final results of this inquiry as to the presence or absence of albumen in the urine of animals suffering from the cattle plague are—

1st. That albumen is invariably present in some stage of the disease.

2nd. That it is first found in the urine within the third or fourth day after the temperature of the animal has begun rising.

3rd. That the amount of albumen present varies considerably from one animal to the other, but that with the same animal it increases as the disease proceeds, the urine last voided and that in the bladder after death being most albuminous.

With respect to the reaction of the urine, so far as can be concluded from the observations on bullocks No. 22 and 21, the secretion voided in disease is, on an average, more alkaline than in health, but some hours before the animal's death the alkaline reaction falls off rapidly, and the urine extracted from the bladder after the fatal termination may be acid.

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e annexed Tables, pp. 67 *c* and 67 *d*, show the results obtained from the daily examination of the Urine of Bullocks No. 22 and No. 21, collected in the bags.

Examination of Urine, Table VIII.

Urine of Bullock No. 22, in health and disease.

Date.	Quantity.	Specific Gravity.	Quantity of Oxalic Acid in Grains required to neutralize 1 Pint of the Urine.	Urea in 100 Parts of the Urine.	Urea in 24 Hours' Urine.	Mineral Constituents in 100 Parts of the Urine.	Mineral Constituents and Chlorine in 24 Hours Urine.	Albumen.	Temperature of the animal. Taken by Professor Duguid.
March, 1866.	Pts. ozs.				Grains.				
„ 14–15	2 1	1044	129·50	3·67	658·3	- - -	- - -	No albumen - - - -	March 15th—102·8.
„ 15–16	6 14	1015	59·50	1·09	639·0	- - -	- - -	Do. - - - -	„ 16th—102·5.
„ 16–17	1 6	1035	183·75	2·00	227·5	- - -	- - -	Do. - - - -	„ 17th—103·2.
„ 23–24	2 6	1050	240·62	4·27	859·3	4·13 (Cl. 0·742)	813·1 (146·1 Cl.)	Trace of albumen.	
„ 25–26	2 5	1048	183·75	3·01	592·6	- - -	- - -	Do. do.	
„ 26–27	3 17	1040	196·87	2·40	808·5	- - -	- - -	Faintest trace of albumen.	
„ 27–28	4 8	1038	175·00	2·78	1070·3	3·80 (Cl. 0·61)	1712·7 (274·9)	Do. do.	
„ 28–29	5 3	1043	275·62	2·69	1206·6	- -	- - -	Do. do.	
„ 30–31	2 3	1052	255·5	3·68	692·3	- - -	- - -	Do. do. Abundant precipitate of hippuric acid, with No. 5.	April 1st—102·2.
April.									
„ 1–2	2 13	1052	243·25	3·36	779·1	- - -	- - -	Do. do. Much less hippuric acid.	„ 2nd—102·4.
„ 2–3	3 3	1052	301·87	3·12	859·9	4·34 (Cl. 0·405)	1196·2 (111·6)	Do. do. No hippuric acid.	„ 3rd—103·4.
„ 3–4	4 0	1046	315·00	3·01	1053·5	- - -	- - -	Temperature rising do. do. - -	„ 4th—105·4.
„ 4–5	3 7	1046	222·25	2·77	812·0	4·31 (Cl. 0·869)	1263·4 (254·7)	Albumen present more than before -	„ 5th—105·6.
„ 5–6	2 18	1047	246·75	2·96	751·1	- - -	- - -	Albumen present (0·044 in 100 urine) -	„ 6th—106·2.
„ 6–7	3 17	1040	323·75	3·55	1195·9	2·56 (Cl. 0·250)	862·4 (84·2)	Do. do. (0·144 „ „) -	„ 7th—106·0.
„ 7–8	4 8	1024	240·62	3·54	1362·9	- - -	- - -	Do. do. (0·246 „ „) -	„ 8th—105·0.
„ 8–9	1 4	1028	323·75	3·20	336·0	1·30 (Cl. 0·075)	136·5 (7·8)	Very large quantity of albumen present (0·440 in 100 urine.) Died night 9th to 10th of April.	„ 9th—100·0.

Daily average in health 2·92.

Daily average in disease 3·17.

Urine of Bullock No. 21, in House

Date.	Quantity.		Specific Gravity.	Quantity of Oxalic Acid (in Grains) required to neutralize 1 Pint of the Urine.	Quantity of Urea in 100 Parts Urine.		Total Urea in 24 Hours' Urine.	Mineral Constituents (and Chlorine) in 100 Parts of the Urine.	Mineral Constituents (and Chlorine) in 24 Hours' Urine.	Albumen.	Temperature of Animal taken by Professor Duguid.
March 1866.	Pints	Ozs.					Grains.				°
14–15	6	3	1049	245·00	3·36		1808·2	- - -	- - -	Faintest trace of albumen.	March 14th—100·8.
16–17	1	15	1037	172·37	2·30		352·2	- - -	- - -	No albumen.	„ 15th—102·1.
18–19	3	10	1034	157·50	1·86		560·6	2·83 (Cl. 0·398) -	- - -	Trace of albumen.	„ 16th—102·0.
19–20	4	8	1041	148·75	2·54		977·9	4·215 (Cl. 0·631) -	866·7 (121·9 Cl.)	Faintest trace of albumen.	„ 17th—103·0.
20–21	4	7	1037	197·75	2·54		966·8	- - -	1604·3 (240·2 Cl.)	No albumen.	„ 18th—102·6.
21–22	4	3	1048	150·50	2·27		824·3	- - -	- - -	Ditto.	„ 19th—102·0.
22–23	3	10	1042	172·37	2·43		727·2	- - -	- - -	Faintest trace of albumen.	„ 21st—102·1.
23–24	3	16	1050	253·85	3·49		1160·4	- - -	- - -	Not tested.	
25–26	3	0	1052	245·00	3·63	Daily average in health 2·66.	952·9	4·47 (Cl. 0·893) -	1173·4 (234·4 Cl.)	Placed near an infected cow at 5 p.m. Trace of albumen.	„ 26th—102·0.
26–27	3	8	1047	231·87	3·20		952·0	- - -	- - -	Trace of albumen.	„ 27th—102·5.
27–28	3	10	1044	198·62	2·60		796·2	- - -	- - -	Ditto.	„ 28th—102·2.
28–29	9	2	1030	166·25	1·97		1568·6	2·71 (Cl. 0·400) -	2157·8 (318·5 Cl.)	Faintest trace of albumen.	„ 29th—101·8.
30–31	4	0	1049	249·37	2·37		827·8	- - -	- - -	Trace of albumen.	„ 30th—103·0.
31–1st Aprl.	4	15	1045	288·75	2·30		955·9	3·68 (Cl. 0·479) -	1529·5 (199·1 Cl.)	Ditto (temp. rising).	„ { Morning 102·6. Afternoon 104·.
1–2	2	5	1048	231·87	3·00		590·6	- - -	- - -	Ditto.	April 1st—104·8.
2–3	4	12	1028	172·37	1·95	Daily average in disease 3·25.	784·9	2·075 (Cl. 0·328) -	835·2 (132·0 Cl.)	Trace of albumen, rather more than before.	„ 2nd—107·0.
3–4	2	14	1039	393·75	3·09		730·0	- - -	- - -	Albumen increasing.	„ 3rd—106·8.
4–5	2	16	1039	371·87	4·16		1019·2	2·26 (Cl. 0·076) -	555·0 (13·6 Cl.)	More albumen than on day before.	„ 4th—105·9.
5–6	1	5	1032	275·62	2·38			- - -	- - -	Tolerably large amount of albumen present.	„ 5th—106·8.
6–7	2	4	1041	332·50	3·30		635·2	1·70 (Cl. 0·029) -	327·2 (5·6 Cl.)	Albumen the same.	„ 6th—103·8.
7–8	0	15*	1042	310·62	4·88			- - -	- - -	Ditto.	„ 7th—102·9.
								- - -	- - -	Ditto.	„ 8th—102·7.
8–9	1	0	1036	294·87	4·64		406·0	1·22 (Cl., nearly quite absent)	144·1 - -	Ditto.	„ 9th—103·8.
9–10	1	7	1024	125·12	2·80		330·7			Died night of 10th to 11th April. Urine of bladder after death contained 1·78 per cent of urea; was acid and very albuminous.	„ 10th—104·.

Some urine lost.

* Collected in 14 hours.

On the Pathology of the Cattle Plague, and on its Relation to Human Dise

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

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Dr. Murchison. Report to Commissioners.

THIS Report is founded on numerous observations of diseased animals during life in the cow-sheds and knackers' yards of the metropolis, on the post-mortem examination of 33 cattle which have died of the plague,* and on an extensive experience of those human diseases to which the Cattle Plague has been thought to be most closely allied.

A. SYMPTOMS OF THE CATTLE PLAGUE.

The earliest symptoms of the disease are dulness and prostration. The animal has a dull, heavy, timid, countenance, and lies down more than usual. When standing, its head and ears droop, or sometimes the head is extended, as if from pain in the neck. The appetite diminishes or is capricious; some articles of food are eaten, while others are refused. Auscultation of the chest betrays nothing abnormal. These symptoms may last for a few hours, or for several days, but may be often absent or may escape detection.

The next symptoms, which, in most cases, are the first to attract notice, as the follows:—There is an appearance of chilliness, together with general tremors and spasmodic twitchings of the muscles of the neck and flanks. There are alternate heats and chills of the ears and of the roots of the horns. In many cases, but not in all, the skin is tight and hide-bound; the coat stares; the head still droops; the legs are approximated under the body, and the back is arched;† the animal's gait is stiff; it yawns and grinds its teeth. The temperature of the whole body is perceptibly increased; the mouth and roots of the horns are hot, and the pulse rises to 60 or 70 or more.‡ The respirations are quickened; there is a short, husky cough, and there is great tenderness along the spine and in the loins. At the same time the secretion of milk (in the cow) is greatly diminished or entirely arrested. A cow may yield several quarts of milk in the morning, and in the evening almost none. The udder is flabby and shrivelled, and the milk thick and creamy. The diminution in the quantity of milk is often the first symptom noticed. The function of rumination is also soon suspended, so that the appetite for solid food fails, but the desire for drink is intense. Occasionally, however, the animal will continue to eat small quantities of hay until the last, but it appears to have considerable difficulty in deglutition. The bowels, for the first two or three days, are confined, and the excrement is dry. The urine is scanty and highly coloured, and sooner or later, in most cases, it contains albumen, or even blood, with epithelial and fibrinous casts.

On the third day, sometimes earlier and sometimes later, but sometimes not at all from first to last, diarrhœa sets in, the motions being pale brown or dirty yellow and relaxed. About the same time, or earlier, a transparent watery discharge from the eyes, and a discharge of clear viscid mucus, hanging in long strings from the nostrils and mouth, are observed. The conjunctivæ and the lining membrane of the mouth and nostrils are unduly injected. The membrane lining the interior of the lips and the gums is roughened from the development of numerous pimple-like elevations, consisti accumulated epithelium. Similar pimples, but larger size and harder, together with circumsc erythematous patches, or the latter only, may b served on the skin, especially on the back of the and shoulders, on the udder and scrotum, on the of the thighs, and surrounding the openings c mouth, nostrils, rectum, and vagina. The dysp increases, and the respirations are not only quick interrupted in a remarkable manner by the spasr twitchings of the muscles of the chest. There i a short husky cough, and the pulse continues q but loses power.

As the disease advances, the diarrhœa grad assumes a dysenteric character. The motions fluid, but vary in appearance in different cases. are pale yellow, or they are watery and almost co less, or they consist for the most part of transp viscid or opaque puriform mucus; at other times present tints varying from a pale chocolate to a reddish-brown hue, owing to the admixture of b and not unfrequently they contain flakes or s masses of solid blood. They have always a pec sour, fetid odour. The purging is often accompa by tenesmus and retraction of the abdomen. The lids are swollen and encrusted with inspissated m The discharge from the mouth and nostrils incre in quantity, becomes thicker and opaque, and is m with white flakes of aggregated epithelium sc The rough elevations on the gums and interior of lips assume the form of aphthous encrustations, s of which become detached and expose abrasion superficial ulcerations of the subjacent membr Aphthæ may also be observed on the membrane rounding the entrance to the nostrils and on tongue. The breath is very offensive. The v becomes swollen, red, irritable, and studded v aphthous crusts, similar to those observed in mouth. The pimples on the skin become cov with hard crusts, beneath which there is often a s quantity of opaque fluid resembling pus; and several cases I have noticed conical or flattened vations of the cuticle, without any super-impo crust, but containing a similar opaque yellow fluid, in every character resembling pustules. Petechiæ frequently interspersed among these pustules crusts. The pulse beats from 80 to 110, and is s and feeble, or even intermittent. The dyspr increases; there are spasmodic twitchings of nostrils, and the respirations are quick (36 to laboured and irregular, but the cough is less quent and audible. Sonorous rales can sometimes heard over the chest. The animal repeatedly mo At one time it is restless, constantly getting up lying down again; at another time it is in a state stupor, with its head drooping, its eyelids closed, eyes sunken, and not uncommonly involuntary m cular twitchings of the limbs. The symptoms, in f closely correspond with those of the "typhoid sta of human maladies. The extremities become c and the prostration rapidly increases. The ani preserves the recumbent posture, or, if made to ge and walk, it staggers and falls. In cases of severity, however, the animals are sometimes able walk throughout the attack; and even in fatal ca I have known them walk steadily till within an h or two of death. Except in very rapid cases, there

* These observations were commenced early in August 1865, and have been continued down to the present time.

† This appearance is neither constant in, nor peculiar to, the Cattle Plague.

‡ The pulse of a healthy ox is about 40 to 55.

emaciation. The whole body exhales an offen-
ickly odour, and, in some cases, gas is discovered
e subcutaneous areolar tissue of the loins and
imparting to it an emphysematous character,
using it to crackle on pressure. During this
pregnant cows often abort.
this state of extreme exhaustion the fatal event
occurs, somewhat suddenly at the last. In most
e cases that I have had an opportunity of ob-
g, death has taken place from the sixth to the
day of the disease; but there are many instances
ich it has happened from the second to the
day, and some where it has occurred within a
ours of the commencement of the attack.
the animals which recover, improvement gene-
commences about the seventh or eighth day;
nvalescence is slow, so that complete restoration
lth is not attained for several weeks. The en-
tions resulting from the eruption separate in the
of thick scales or scabs, together with portions of
air, and during this process the animals exhibit
takeable signs of great itchiness. Occasionally
scharge of urine is observed to be copious, and in
ases there is slight œdema of the legs.

NATOMICAL LESIONS OF THE CATTLE PLAGUE.*

e main anatomical characters of the disease,
ding to my observations, are catarrhal or croupal
amation of the lining membrane of the digestive
, of the respiratory passages, and, in fact, of all
ucous membranes; an unusually dark colour of
lood; ecchymoses or hæmorrhages in various
, such as beneath the skin and into its substance,
th the mucous and serous membranes of the
achs and bowels, and beneath the endocardium;
phthous condition of the mouth, nostrils, and
a; and a peculiar eruption on the skin. The
which are most altered from their healthy con-
n vary considerably in different cases.

Digestive system.—The mucous membrane of
digestive canal is inflamed throughout, but in
parts the inflammatory signs are more intense
in others.

ne lining membrane of the mouth and pharynx is
or less reddened and coated with viscid mucus,
often presents patches of purplish discolouration.
thæ, or red patches resulting from denudation of
pithelium or from actual ulceration are seen on the
s, lips, palate, tongue, inner surface of cheeks,
lottis, and aryteno-epiglottidean fold. On scraping
these aphthous encrustations the corresponding
ace of the mucous membrane appears raw or
rficially ulcerated. The aphthous crusts are com-
d of epithelium scales containing much granular
er in their interior, and evidently undergoing
tegration, free granules and rounded nuclear
uscles of pretty uniform size, the latter being
fly found on the part of the crust nearest to the
ous membrane (see Plate XI., figs. 1 and 2).
y often accumulate in masses in the hollow between
lips and gums. The mucous follicles about the
es and at the root of the tongue are sometimes
rged and distended with secretion. The tonsils
also slightly enlarged, and when cut across large
gs of viscid secretion can be drawn out of them.
he mucous membrane of the *œsophagus* is some-
es slightly reddened, but usually appears healthy.
he first two *stomachs*, the *paunch* and the *reti-
um*, are always greatly distended with food, owing
he function of rumination having been suspended
some time before death, but the ingesta are pre-
ly similar to what are found in the stomachs of
thy animals. On scraping off the thick layer of
helium from these two stomachs, which is done
abnormal facility, the subjacent membrane is
d to be unusually red. The *omasum* or third stomach is also full of food, which is sometimes so hard and dry that it can be almost rubbed to powder between the fingers, and so adherent to the lining membrane that large portions of the epithelium are often detached in attempting to separate it. These characters, however, are not peculiar to the disease, as some continental pathologists have imagined.* The mucous membrane of the omasum, after separation of the epithelium, is usually redder than that of the first two stomachs, and sometimes presents ecchymosed patches of a claret colour or actual eschars, similar to those to be described under the head of the fourth stomach. It is in the fourth stomach, or *abomasum*, however, that I have found the inflammation most advanced. Here there is not only more or less intense redness with much adhesive mucus on the surface, but the membrane is often studded with numerous superficial erosions, like those which are so common in the ordinary catarrhal inflammation of the human stomach, Plate VII., fig. 2, and Plate VIII., fig. 1. On washing away the viscid mucus the membrane often appears denuded of epithelium; it is soft and friable, and may be peeled off with ease. The gastric glands are filled with epithelium, which is unusually granular, and not unfrequently blood is found extravasated into the interior of the glands. In addition to the general redness, which is most intense in the pyloric region, the mucous membrane at this part often presents circular or irregular patches of a claret colour, varying in size from a mere speck to a crown piece. This appearance is due to extreme vascular injection of the parts in question, and sometimes to actual ecchymosis. The colour may be uniform over the patch; but at other times it is limited to its circumference, forming a coloured rim with a central greyish-yellow portion. Occasionally these patches may be seen surrounded by a distinct fissure, and in rare cases the membrane corresponding to the patch separates as a slough, which may be found more or less extensively adherent. On separation of the sloughs, deep excavated ulcers penetrating the mucous, and even the entire muscular coat may remain, as in the remarkable case figured in Plate IX.

It is to be noted that these sloughs are not preceded by submucous deposit of lymph or of exudation of any sort.† The circumscribed patches of discolouration, moreover, are not invariably present. They were absent in more than one-half of the cases examined by me, and the sloughs were present in only five of 29 cases. Similar patches of discolouration and gangrene are also occasionally met with in the omasum, and even in the *rumen*, but here, according to my experience, they are comparatively rare. In one case, however, I have known large ragged openings, through which several fingers could be passed, in the leaves of the omasum, resulting from gangrene.

The *small intestine* is more or less inflamed throughout, and presents the appearances of the ordinary muco-enteritis of cattle. The inflammation is usually most intense about the middle and at the opening into the cœcum, but in extreme cases the bowel is equally affected in every part. Viewed from its serous surface the inflamed bowel presents a blueish aspect, and occasionally small ecchymoses may be seen beneath the serous membrane, but there is never any trace of peritonitis. The coats of the bowel are attenuated and softened. The inner surface, according to the intensity of the inflammation, presents every shade from a rose red to the deepest claret, and occasionally small patches of submucous ecchymosis. The mucous membrane is deprived in a great measure of its epithelium covering, is extremely soft, and

An abstract of this report appeared in the "*Lancet*" and *itish Medical Journal*" for August 26, 1865, and was the published account of the anatomy of the present outbreak attle Plague in Britain founded on actual dissections.

* On the supposition that this impaction of the third stomach was the essential character of the disease, Cattle Plague has been designated *Löserdurre* by some German writers; but a similar condition is very common after death from many diseases in Ruminants.

† In one case I found numerous abscesses, as large as hazel nuts, and filled with thick yellow pus in the walls of the fourth stomach, one of which had burst and discharged its contents through the mucous membrane. They appeared to be of old date.

Dr. Murchison. Report to Commissioners

is detached from the subjacent muscular coat with unusual facility. It is coated with a quantity of transparent and viscid or of opaque and puriform secretion ; and in rare cases, particularly those where the vascular injection is most intense, masses of blood, or of solid exudation composed mainly of epithelial structures, which may be an inch or more in diameter, and which may be tinged with blood or bile, are found loosely attached to the surface, very often to the membrane covering Peyer's patches, or floating free in the contents of the bowel, Plate III. On detaching the adherent masses of lymph, the mucous membrane beneath is found to be free from ulceration, though deprived of its epithelium. In not one of 30 cases which I have examined have I found anything like a true ulcer extending through the mucous coat, although in several of the cases the disease had lasted from 10 to 14 days.

The lining membrane of the *large intestine* is also inflamed, but less so than that of the small.* The inflammation is usually most advanced in the cœcum. The mucous membrance is more or less reddened, the redness being greatest over the prominences of the rugæ and in the rectum. Here also may be seen patches of ecchymosis and sometimes superficial excoriations or small ulcers. The surface is coated with a quantity of viscid mucus containing flakes of lymph and often blood. (Plate VII. fig. 1.)

The *contents of the bowels* are fluid, and consist of fæces mixed with inflammatory products and often with blood. In a few instances, where the inflammation was most intense, I have found the small intestine filled with a gelatinous substance closely resembling the whites and yolks of eggs whipped up together.

Intestinal glands.—I have failed to discover any enlargement of the solitary glands of the ileum which could be ascribed to the disease. Peyer's patches, in the early stages of the disease, are sometimes even less vascular than the surrounding mucous membrane, and from first to last they are much less elevated and much thinner than in a healthy animal. In the healthy ox these patches are much more prominent and developed than the corresponding parts in man ; they are raised at least one-fifth or one-sixth of an inch above the general level of the mucous membrane (Plate I. fig. 2), and they can be felt through the coats of the bowel before it is slit open. But in animals that have suffered for six or seven days from the cattle plague, it is impossible, with closed eyes, to indicate the situation of the patches with the finger passed even along the mucous surface (see Plate IV.), and in cases where the inflammation is extreme it is sometimes impossible with the naked eye to discover any trace of them. This has happened to me on three occasions, on each of which the bowel was twice carefully examined throughout its entire length, two of the animals being examined in conjunction with my friend Dr. A. P. Stewart. In the early stage of the disease, although the entire patch is less elevated, the component glandules are more distinct than in health, for two reasons ; 1, because the epithelium covering, which obscures them in health, has been mostly removed ; and 2, because many of them contain a minute drop of opaque yellow softened secretion like pus, which can be squeezed out on the slightest pressure. This fluid when submitted to microscopic examination is found to contain pus corpuscles, with numerous transitional forms between them and the corpuscles found in the interior of the Peyerian glandules of a healthy ox. (Plate X. figs. 1 and 2.) As the disease advances, the opaque yellow bodies burst and discharge their contents, and the Peyer's patch exhibits a pitted, reticular aspect, owing to the open and empty condition of the glandules. (Plate IV.)

In the same patch certain of the glandul sometimes be seen filled with pus, and pr the appearance of opaque round bodies about of mustard seeds, while others are empty. (Pl When the morbid process is still further adva trace of the Peyerian glands often disappears ; cases their free surface is coated with exudatio in not one of 30 cases have I found them to be of ulceration. The changes which take p Peyer's patches are obviously the result of th ral intense inflammation of the mucous me There are no submucous deposits and none lesions running through definite stages to ulc which I am familiar with in the typhoid or fever of man.

It is right to mention, however, that in n the cases which I have examined, many of t tary glands, and sometimes certain of the con glandules of Peyer's patches, have been grea larged, filled with a soft or firm cheesy matt in rare instances (in the case of the solitary even ulcerated on the surface. A drawing inflamed piece of bowel studded with these e glands might readily be thought to represe lesions of enteric fever (Plate II.) Careful ex tion, however, shows clearly that the appeara question are of old standing, and quite uncon with the disease of which the animals hav They have a peculiarly hard feel, inconsiste what we find in the enlarged solitary glands enteric fever of man, and when cut into th found to consist of a thick firm cyst, out of wh contents can be scooped or squeezed as a g mass. Both these characters distinguish the the lesions of human enteric fever. The micr moreover, shows the contents to be made up matter, compound granular cells and granular and a few scales of cholesterine, appearances indicate a chronic rather than an acute aff (Plate X. fig. 6.) But what removes all doub the matter is the fact that I have found pr similar appearances (Plate X. figs. 3, 4, and usually, indeed, even more strongly marked— small intestine of every one of six successive h oxen which I have examined (Plate I. fig. remember also Professor Goodsir, of Edinburg scribing this common condition of the int glands in cattle in his lectures on Comparative tomy nearly 20 years ago. The effect of the g inflammation on these enlarged glands is to r them smaller, and in rare cases to soften thei tents into a substance resembling thick cream.

The *mesenteric glands* are sometimes slight jected, but in most cases they present no alterat appearance or structure, and they never contai abnormal deposit met with in the enteric fever of

The *liver* is pale and rather soft, and its secr cells in many cases contain an undue amount o The bile is almost invariably thin and watery, a a pale greenish-yellow colour.

II. *Respiratory System.*—The lining membra the nasal passages, and more particularly of the pipe and bronchial tubes, invariably displays sig inflammation. The membrane is more or less t and reddened, and its surface is coated with v mucus, and in many cases with numerous soft r branous patches of yellowish exudation, som them an inch or more in diameter. These flake easily removed from the subjacent membrane, w may present a raw or excoriated aspect, but n any appearance of submucous deposit. In some there is considerable œdematous swelling of the r glottidis, and, very rarely, patches of ecchymos sphacelus are found in the interior of the lar The bronchial tubes are often filled up with fr mucus and with the inflammatory products throw from the mucous membrane; but the lungs and pl exhibit no sign of inflammation, except as an sional complication.* Small ecchymoses beneath

* Professor Simonds found the chief ravages of the disease on the continent to be in the large intestines ; but this discrepancy only illustrates the statement already made, to the effect that the parts most altered from their normal condition vary greatly in different cases.—(See Report on the Cattle Plague, *Journ. of Roy. Agricult. Soc.*, vol. xvii. 1857.)

* Dr. Smart has found a proportion of two-thirds of a animals examined in Edinburgh to be affected with pl

e are sometimes observed, and in many cases is more or less hypostatic congestion of the Interlobular emphysema is also a not uncommappearance, and occasionally is very extensive.

. *Circulating System.*—The heart is pale and ; its cavities are usually empty, and ecchymoses ccasionally observed beneath the endocardium. is no staining of the lining membrane of the The blood in the large vessels is fluid and dark; but, when removed from the body, it lates and forms a tar-like clot, which reddens xposure to the air. The red corpuscles sometpresent a shrivelled crenate appearance, as in n typhus, but in many, if not most, cases they ounded as in health.

e structure of the spleen is usually unaltered, ccasionally it is preternaturally soft and friable.

. *Genito-Urinary System.*—The mucous mem- of the vulva and vagina is often red and swollen oated with viscid mucus. That of the vulva is studded with aphthæ. The lining membrane of ladder, and even of the ureters and pelves of eys, also in many cases presents signs of inflamon, and even patches of submucous ecchymosis. kidneys, in the early stages, are often intensely ræmic throughout; but in the later stages the x is usually pale, while the pyramids are con-d. The uriniferous tubes are gorged with finely ular epithelium.

. *Nervous System.*—The pia-mater is preternatuinjected, and occasionally presents minute ecchyes (from violence in removal ?). The sub-arachserosity, the fluid in the ventricles, and that in pper part of the theca vertebralis are increased uantity. The brain-substance appears healthy.

I. *Muscular System.*—The flesh of animals ghtered in the early stage of the disease is but altered in appearance, and not at all altered in oscopic structure; but in the advanced stages it nusually dark, of a dusky purple hue, and under microscope it occasionally presents a granular eneration of the muscular fibrillæ, similar to what bserved in the muscles of human typhus and eric fever.*

VII. *Integuments and Areolar Tissue.*—The subaneous areolar tissue of the loins occasionally pretts an emphysematous appearance. It is blown up h fetid gas, and discoloured in some instances from ipient putrefaction. The emphysema, however, is the result of *post-mortem* decomposition, for it y be distinguished during the animal's life, so that air is probably derived from the lungs, which e been shown to be occasionally the seat of interular emphysema. In no case have I met with boils abscesses of the integuments.†

But the most remarkable and important change erved in the skin is the eruption already referred It is not confined to any particular part of the eguments, but is most abundant on the back of the k and shoulders, in the neighbourhood of the uth, on the udder and scrotum, on the inside of the ghs, and on the integuments surrounding the anus and the entrance to the vagina. Its appearance varies according to the stage of the disorder, but in many cases it may be found to consist of three distinct elements. 1. Patches of roseola or erythema; 2. Pustules and scabs; and 3. Petechiæ. 1. The patches of roseola vary in size and in intensity of colour. In one remarkable specimen recently shown to me by Professor Spooner the whole hide was covered with these patches, some of which were not larger than a pea, while others had a diameter of seven or eight inches. This roseola is the element of the eruption which first makes its appearance, so that if the animal, as often happens, dies within the first three or four days of the malady, it is the only eruption visible. I have found it present as early as the third day. On making sections into these roseolar patches, the appearance is found to be due to hyperæmia of the superficial layer of the cutis. In the more advanced stages of the disorder the epidermis and hair-bulbs corresponding to these roseolar patches are found to be detached with unusual facility, and the former often separates in the form of a furfuraceous desquamation. 2. The scabs are for the most part situated on the patches of roseola. Their number varies greatly. They may be discrete or confluent, and in the latter case the appearance presented by the scabs and hairs matted together is not unlike that of *impetigo capitis* in the human subject. The scabs are occasionally found to be mixed up with minute pimples or elevations of the cuticle, which vary in size and may be softened in their interior into an opaque yellowish fluid so as to form distinct pustules, the fluid being confined by a membranous elevation of the cuticle, without any super-imposed scab. I have not yet succeeded in discovering anything like a distinct vesicle with a diaphanous membrane and limpid contents preceding the pustular stage. On detaching the scabs, the corresponding surface of the subjacent cutis is often found to be depressed and superficially ulcerated (Plate XI. fig. 3), and if the scab have separated spontaneously, its site is often marked by a minute pit or cicatrix. Between the scab and the cutis there is often a small of quantity opaque yellow fluid similar to that already described. The scabs, when submitted to microscopic examination, are seen to consist of epidermal scales, granular matter, and globular bodies, resembling pus corpuscles in size and general appearance, and with acetic acid exhibiting the reaction of nuclei. (Plate XI. fig. 4.) The fluid matter found in the pustules and beneath the scabs is made up of epidermal cells more or less modified in form, nuclear bodies, occasionally true pus corpuscles, and granular matter. (Plate XI. fig. 5 and 6.) The scabs and pustules are best studied in animals which survive the sixth or seventh day of the disease. When death occurs early, they may be entirely absent. As it has been asserted that nothing deserving the name of pustules is ever met with on the skins of animals affected with rinderpest, it may be well to state that in one case which I examined with Dr. Quain and Mr. Campbell De Morgan, F.R.S., both gentlemen were satisfied of the existence of pustules, containing true pus corpuscles, with altered epithelium, in their interior. Mr. Sibley also, who saw the contents of one of these pustules under the microscope, recognized "model pus corpuscles."* It is right, however, to add that in many cases I have observed only the scabs, and nothing like the pustules here described. 3. Interspersed among the other elements of the eruption, petechiæ of a purplish or brownish tint, and from one to several lines in diameter, may occasionally be observed. Under the microscope these spots are found to be mainly due to an infiltration of dissolved hæmatine, but sometimes they exhibit altered blood pigment in the form of brownish granules, isolated or adhering in masses, in the superficial layer of the cutis. The eruption now described accounts for the scars and discolourations which tanners have so often

umonia (see Report presented to Magistrates of Edinburgh, t. 12th, and *Med. Times and Gaz.*, 23rd Sept. 1865, p. 355). experience in London has been very different. I have only with pleuro-pneumonia in one or two cases of Cattle Plague; I have known animals die of pleuro-pneumonia, which had n erroneously thought to have suffered from Cattle Plague.

There is abundant evidence that the meat of rinderpest tle, when cooked, is harmless as human food. (See, for mple, Dr. Mortimer's "Account of the distemper raging mong the Cow-kind," *Philos. Trans.*, 1745, vol. xliii. p. 535; Brocklesby's essay on "The Mortality among the Horned Cattle," London, 1745, p. 28; the Fifth Report of the Medical icer of the Privy Council, 1862, p. 30; and Dr. Crisp at h. Soc. of Lond., 17 Oct. 1865, *Lancet*, Oct. 21st, 1865.) Its , however, is not on this account to be recommended.

The cases of Cattle Plague seen by Layard at Godmanster in 1756 were characterized by large boils and "putrid bscesses" under the skin, and in various parts of the body. *ssay on the Nature, Causes, and Cure of the Contagious Disper among the Horned Cattle in these Kingdoms. By D. P. yard, M.D., F.R.S.*, London, 1757.)

* A drawing of the eruption in this case is appended to Professor Varnell's Report.

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noticed in the hides of cattle that have died of the plague. In addition to the above appearances on the skin, I have frequently noticed solid warty-looking excrescences on the teats and udder, which have probably no connexion with the disease.

VIII. *General Appearances.*—The bodies of cattle that have died of the plague are usually emaciated, and prone to decomposition. They also emit a peculiar penetrating offensive odour, which may be retained for hours or even days in the clothes of persons much in contact with them.

C. Pathological Relations of the Cattle Plague to other Diseases.

The whole history of the Cattle Plague now prevalent in Britain shows that it is identical with the *rinderpest* of German writers, and that it is a contagious febrile disease belonging to the same class as the human exanthemata. The foregoing descriptions make it clear that it is entirely distinct from the milzbrand or carbuncular murrain on the one hand, and from the epidemic pleuro-pneumonia or pulmonary murrain on the other. Different observers, however, have imagined that the rinderpest, or Cattle Plague, is not merely analogous to, but intimately connected, if not identical, with certain human diseases; and it is of the utmost importance, not only in reference to the Cattle Plague itself, but also as regards human pathology, to determine the truth or fallacy of these opinions. The human diseases to which Cattle Plague has been thought to be most closely related are typhoid or enteric fever, typhus, scarlatina, variola, erysipelas, dysentery, and influenza. It will be well to consider in detail the points of resemblance and difference between the Cattle Plague and the several human diseases now mentioned.

1. *Enteric Fever.*—For more than half a century many veterinary authorities in Germany have maintained that the rinderpest is the precise counterpart or pathological equivalent of the abdominal typhus or enteric fever of man,* and this opinion found such zealous advocates in this country at the commencement of the present outbreak, that for a time it may be said to have been almost a matter of popular belief. This view, however, has for the most part been expressed by veterinary surgeons who have had little or no personal knowledge of the lesions of human enteric fever, or by writers who have drawn their conclusions from veterinary writings before examining for themselves the intestines of healthy and diseased cattle. Human enteric fever is characterized by definite and easily recognized anatomical lesions; and, for my own part, I have never been able to discover any analogy whatever with them in those of rinderpest. The alterations of Peyer's patches in the latter disease are clearly the result of the general inflammation of the mucous membrane, and tend to obliterate the glands, instead of rendering them more prominent. Their resemblance to the lesions of enteric fever is much less than that of the condition of the corresponding glands in cases of cholera, small-pox, scarlatina, pyæmia, and other blood-diseases. It is probable that the diminution in the size of Peyer's patches in rinderpest, as compared with the glands in a healthy ox, may be due in part to the length of time that has elapsed since digestion has been arrested, as it is well known that these glands are larger and more developed during the digestive process than during fasting. But whatever be the cause, nothing can be greater than the contrast between the appearance of these glands on the tenth day of rinderpest and on the corresponding day of human enteric fever. In the former case the glands have almost, if not entirely, disappeared; in the latter they are extremely prominent (compare Plates IV. and V.), owing to abnormal deposit in and around the glandules. The contrast is even more remarkable when it is remembered that the glands in the healthy ox are so much more developed and prominent than in the healthy human subject. Moreover, ulceration of Peyer's p consequent on the softening and sloughing of deposit, which is the rule in enteric fever (se VI.), is not found in rinderpest. There was r ration or sloughing in any one of 30 cases ex by me; and although it is possible that, in case treme inflammation, there may sometimes be su ulceration or even sloughing of the bowel, as we the stomach, it is probable that masses of blood udation coloured by fæces and adherent to the r membrane have often been mistaken for s My opinion as to the absence in rinderpest essential lesions of enteric fever is corrobora Dr. A. P. Stewart, well known as an autho every question connected with human fevers, Buchanan, my colleague at the Fever Hospit Simon, Medical Officer of the Privy Council, D veking, Dr. C. B. Radcliffe, Dr. Burdon Sand Dr. Anstie, and many other physicians who dissected the diseased cattle, either in conju with me, or independently. As far as I kn similar opinion has been expressed by every E physician who has described the lesions of th vailing epizootic, and whose opinion is the re actual dissections. Dr. Smart, for instance, wh instructed by the magistrates of Edinburgh to tigate the pathological appearances of the dise his official report dated Sept. 12th, 1865, thus:—

"The whole mucous lining of the bowels is u soft, and its epithelium imperfect. There a *true ulcerations*, and in this respect its con differs broadly from the ulcerative typhoid of * * * "There has been much disc as to the condition of the intestinal glands. I repeatedly had occasion during the dissectio show that they did not share to any marked e in the altered condition of the membrane, with they are so intimately connected. They are les minent, and their outline is obscured by the disco tion of the superjacent membrane. They are *ulcerated*, but a chronic tuberculous conditi the solitary glands is of frequent occurrence. is commonly met with in healthy animals, and significant of any particular form of disease. mesenteric glands show no lesion of structure."*

Dr. Aldis, Medical Officer of Health for the p of St. George's, Hanover Square, in the accou the morbid appearances which he found, observes

"No prominent or diseased glands were obs in the intestines, though looked for carefully, were there traces of ulceration."†

Mr. F. J. Burge, also, Medical Officer of Healt the parish of Hammersmith, who has examin large number of the diseased cattle, thus desc what he found in the intestines:—

"On examination of the softened mucous m brane itself I have found *no ulceration*." * "Peyer's patches have been usually less visible natural. Sometimes I have observed apparently enlarged glandular body containing opaque ma with a black spot in the centre, and of tuberc form; but this appearance I believe to be due chronic enlargement of a solitary gland."‡

At a meeting of the Pathological Society on Oct 17th, 1865, Dr. Crisp, who has also dissected a l number of rinderpest cattle, entirely corroborated account of the intestinal glands. In none of his c was there any ulceration of the small intestine any lesions resembling those of human enteric fev

In the valuable report of the Medical Commi of the Norfolk Cattle Plague Association the intest glands are thus described:—

"Peyer's patches are never found thickened ulcerated; they are sometimes seen covered with a layer of discoloured and softened muc membrane, the discoloured patch extending irre

* Neue Untersuchungen über die pathologische Anatomie der Rinderpest, von Joseph Ravitsch. Berlin, 1864, p. 8.

* Official Report, dated Sept. 12th, 1865, p. 3; also *Times and Gaz.*, Sept. 23rd, 1865, p. 354.

† *The Times*, Sept. 14th, 1865.

‡ *British Medical Journal*, Sept. 9th, 1865, p. 274.

yond their superficies, but its extent appa- influenced by their presence beneath."*

above are all the published accounts of dissec- y English physicians of cattle which have bed to the prevailing epizootic that I have le to discover; and it is to be noted that the as to the absence of the essential lesions of fever is unanimous.

the descriptions of the lesions of rinderpest y the best veterinary writers do not, as has ted, correspond with those of human enteric Those of Professor Simonds of London, Pro- Röll of Vienna, and M. Rénault of Alfort, cited by way of illustration.

yer's glands," says Professor Simonds, "are nvariably diseased; but, like other follicular ngs of the digestive canal, they are often ed *with layers of lymph*, beneath which ulce- n is occasionally observed, but *more frequently surface is healthy*, althongh turgid with ." †

essor Röll of Vienna describes the intestinal of rinderpest as follows:—

ersten Stadium nämlich hat Rinderpest immer ussern Erscheinungen eines allgemeinen inten- Katarrhs; im 2 Stadium die beträchtlicher adation, und nach Erweichung und Entfernung iben eine Depression der Schleimhaut, nur n aber leichte Exkoriation bemerkt. Im 3 ium sind die Exsudations-massen mehr oder ger zerflossen und im Darmkanale mit flüssigen lmassen gemengt." The appearances pre- by Peyer's patches in the several stages of sease are minutely described by Röll, and his tion closely corresponds with that above given result of my own observations, including the drops of yellowish-white fluid in the interior component glandules. He also refers to croupal ions on the free surface of Peyer's patches, other parts of the mucous membrane, which tely become detached, the surface of the patches resenting an areolar or sieve-like aspect."‡

s to be observed, that both Professor Simonds rofessor Röll speak of exudation *on the surface* mucous membrane, and insist on the rarity of ulceration.

Rénault, late Director of the Imperial Veterinary e at Alfort, pointed out that the condition of testinal glands in rinderpest was not peculiar to isease, but was met with after death from other maladies. Thus, in his official report on pest to the French Government in 1855, he of its essential lesions in the following terms:— nfin, ce ne sera pas non plus l'altération si arquable que nous avons trouvée, et que sig- aient en même temps que nous MM. Bugdaleck Spinola, dans les glandes de Brunner, et les ques de Peyer; car il n'est rien moins que ontré que cette altération ait existé dans les erses épizooties typhoïdes observées jusqu'au- rd'hui; et d'ailleurs, il est constant que des ons identiquement les mêmes ont souvent été uvées sur ces glandes muqueuses chez les bêtes ines qui avaient succombé à des maladies hoïdes sans doute, mais qui ne sont pas le *hus contagieux* (rinderpest). Le rapporteur de ommission, depuis son retour d'Allemagne, a eu casion d'en observer des cas bien remarquables s plus d'une circonstance, et notamment en llet 1855, dans le département de Seine-et-Oise."§

It is not surprising that the same changes of the intestinal glands should be found in other bovine maladies as well as in rinderpest, seeing that they are constantly met with in healthy cattle.

Lastly, it may be mentioned that Professor John Gamgee, who at first was led to the opinion that the rinderpest was analagous to the enteric fever of man, has entirely renounced this view since he has had an opportunity of examining the anatomical lesions of the present epizootic.

There are other anatomical characters, however, besides those of the intestinal glands, by which rinderpest is distinguished from enteric fever. The enlargement of the spleen, and the deposit in the mesenteric glands, so common in enteric fever, are absent in rinderpest; and, on the other hand, the peculiar eruptions on the skin and in the mouth, the intense catarrhal and croupal inflammation of the mucous membrane of the entire digestive tract, and of the mucous membranes generally, and the peculiar lesions of the the third and fourth stomachs which characterize rinderpest, are not met with in enteric fever.

Again, not only do enteric fever and rinderpest bear no resemblance to one another in their pathological anatomy, but in their clinical history, symptoms, and duration they are entirely distinct. The "typhoid state" developed in the course of rinderpest is met with in the advanced stage of most acute diseases, and is not peculiar to the so-called "typhoid" or enteric fever.

Further, the two diseases differ remarkably in their contagious characters. Although it is generally believed that enteric fever is communicable from the sick to persons in health, its power of propagation is by most competent observers acknowledged to be small. A signal illustration may be mentioned. During the last four years upwards of 1,100 cases of enteric fever, and 1,450 cases which have not been examples of any form of specific fever, have been treated in the same wards of the London Fever Hospital, interspersed among one another. Not one of the patients in these wards has contracted enteric fever, and the nurses and other attendants have enjoyed a like immunity. The history of the propagation of rinderpest shows how very different it is in this respect, and it also shows what a powerful argument in favour of the extreme contagiousness of human enteric fever might be based on the supposition that the two diseases were the precise counterparts or pathological equivalents of one another.

2. *Typhus.*—But while many writers have insisted on the identity of the rinderpest with human enteric fever, others have maintained that it is identical with typhus. In France, indeed, the disease has long been known as the "*typhus contagieux des bêtes à cornes.*"* This view is mainly based on a supposed analogy between the two diseases in respect to their etiology, and on the fact that both diseases are eminently contagious, and that rinderpest, like typhus, has often been observed to follow in the train of armies in the field. There can be no doubt that rinderpest in several ways resembles human typhus; but when it is considered that the inflammation of all the mucous membranes, the cutaneous eruption, and the other lesions of rinderpest are not found after death from typhus, it seems that the view as to the pathological identity of these two diseases must also be abandoned.

3. *Influenza.*—During the present outbreak, Cattle Plague has frequently been spoken of as a form of influenza. It resembles human influenza in the catarrhal inflammation of the respiratory passages, accompanied by fever and great prostration. The other anatomical lesions of Cattle Plague, however, and particularly the cutaneous eruption, are foreign to influenza; but the grand point of distinction is the

eport of the Medical Committee of the Norfolk Cattle e Association, Norwich, 1865, p. 10.

eport on the Cattle Plague, *Journ. of Royal Agricult.* ol. xvii., 1857. (The italics are not in the original.)

ehrbuch der Pathologie und Therapie der Hausthiere, 1860, p. 350; and Schmidt's Jahrb. des Gesammt. Med., No. 97, p. 244. It is not a little remarkable that while writings have been referred to in this country as proving ntity of rinderpest and enteric fever, in Germany he is ed as the opponent of that view. (See Ravitsch, *loc.* 8.)

yphus Contagieux du Gros Bétail.—*Recueil de Méd.* n., Dec. 1855.

* See one of the best descriptions ever published of the disease in the article "Epizootie," by M. Guersent, in the *Dict. des Sciences Méd.*, 1815.

Dr. Murchison. Report to Commissioners.

extreme contagiousness of the Cattle Plague. There can be no greater mistake than to imagine that this epizootic can result from any atmospheric influence. It has been the fashion to refer the present outbreak to the extreme and protracted heat and drought of the late summer and autumn; but it is worth observing that in 1745, in the autumn of which year the disease also appeared in this country, "the spring and summer were very wet, and the ground very damp, and "the autumn was very dry and cold." *

4. *Dysentery.*—Although dysenteric inflammation of the large bowel is present in most cases of rinderpest, this disease differs from dysentery in the inflammation involving the rest of the alimentary tract, often with greater intensity, in its implicating the respiratory and other mucous surfaces, in the presence of a peculiar cutaneous eruption, and above all in its extreme contagiousness and capability of being propagated by inoculation.

5. *Erysipelas.*—Again, several writers have spoken of rinderpest as an erysipelas of the mucous surfaces, and have recommended remedies such as the sesquichloride of iron, in accordance with this view of its pathology. In reference to this comparison, it is sufficient to state that we know of no form of idiopathic erysipelas in the human subject attacking chiefly the mucous membranes, accompanied by a pustular and scabby eruption on the skin, and capable of being propagated to healthy animals by inoculation.

6. *Scarlatina* is one of those diseases which are believed with some reason to have been originally derived from the lower animals. Several recent observers have compared rinderpest to scarlet fever; for example, Dr. Smart, in his Report of the Cattle Plague as observed at Edinburgh, although expressing the opinion that the morbid appearances are peculiar, remarks :—"The disease might not inaptly be termed "an internal or mucous scarlatina. The general "congestive, but non-inflammatory state of the mucous "membranes, the epithelial desquamation from the "mucous surface, the increased temperature of the "animal in the early stage of the disease, and the in-"cubation period and critical days, are facts which "all tend to support this view, while the condition of "the kidneys, the invariable presence of albumen and "blood cells in the urine, lend additional confirmation "to it." But an incubative period, increased temperature, congested kidneys, and albuminous urine are phenomena not peculiar to scarlatina. Rinderpest, moreover, although resembling scarlatina in its extreme contagiousness, differs from it essentially in the following particulars :—1, in the absence of the characteristic phenomena of scarlatina, viz., the lesions of the throat, the peculiarity of the tongue, and the specific rash, followed by general desquamation of the cuticle in large flakes; 2, in the presence of an eruption on the skin different from that of scarlatina; and 3, in the presence of lesions of the intestinal and digestive mucous membranes which are not observed in scarlatina.

7. *Variola.*—The resemblance of the Cattle Plague to human small-pox has long been recognized. Upwards of 150 years ago Ramazzini, in his admirable account of the Cattle Plague which pervaded Italy in 1711, and which was believed to have been imported from Hungary, enumerated among the symptoms "pustulæ quinta vel sexta die per totum corpus "erumpentes, ac tubercula variolarum speciem referentia." † Lancisi, likewise, in his minute description of the same outbreak, observed : "Semper autem "phlogoses, pustulæ, ut innuimus, hydatides, et "ulcera linguam et fauces summo cum ardore "obsidebant;" and again, "Nonne illam in omnium "oculis ponunt, et pelles tabe ad cutem depositâ "depilatæ, et horror pilorum, et armorum, cluniumque tremor, maculis denique, et pustulis in-"fecta cutis? Adeo ut quibusdam in mentem v "cogitare, boves non lue, ut nunc res est, se "pustulis, quas variolas vocant, interire." "nulla forsitan pars in affecto bove reperitur "suæ semina pestis tenacius retineat, et q "versum spargere possit, quam cutis." * The cians who described the outbreak of Cattle Pla Britain in the middle of last century constant ferred to the pustular and scabby eruption. Dr. timer, Secretary of the Royal Society, speaks of "s "eruptions in the groins and axillæ, which itch "for a cow will stand still, hold out her leg and "signs of great pleasure when a man scratches "pustules or scabs for her." † Dr. Brockles marks :—"Frequently one may observe pustules "out on the fifth or sixth day all over the nec "foreparts." ‡ And lastly, in 1758, Dr. I writes thus :—"Whoever will compare the a "ances, progress, and fatality of the small-pox "what is remarked by authors of authority, s "mazzini and Lancisi and other observers, re "to the contagious distemper among the h "cattle, will not be at a loss one moment to dete "whether the disease be an eruptive fever like "the small-pox, or not." § The outbreak of Plague, here referred to, commenced in Engla 1745, and is generally said to have died out end of 12 years, or about 1757, and not to ha appeared until the summer of 1865. But in the disease was again so prevalent and fatal as referred to by H. M. George III., in his speech opening of Parliament in January 1770, as a national calamity. It is a most remarkable fac this last outbreak has been referred to by most r medical writers ‖ as an undoubted instance of s variola occurring in cattle, but that Layard, described both this outbreak and the preceding o the "Philosophical Transactions," regarded the identical, and recommended and practised inocul with pus taken from the skin in both. "It "eruptive fever," he observes, "of the vari "kind, and notwithstanding the exanthemata or "tules may have been so frequently overlooked "none *ever recovered* without more or less erup "* * * Unlike other pestilential, putrid, or m "nant fevers, it bears all the characteristic "ptoms, progress, crisis, and event of the small-"and, whether received by contagion or inocula "has the same appearances, stages, and deteri "tion, except more favourably by inoculation, "with this distinctive and decisive property, th "beast having had the sickness, naturally or artific "never has it a second time." In support o opinion Layard quotes the following passage fr letter addressed to him by a great French auth on Epizootics, Vicq d'Azyr :—"Il me parait, co "à vous, que c'est toujours la même maladie "regné depuis 1711; et qu'elle a des grands rap "avec l'éruption varioleuse." ¶ It may be added the outbreak in 1745 is spoken of as small-pox i able report on vaccination, drawn up in 1839 Committee of the Provincial Medical and Sur Association, including Dr. Baron of Cheltenham, G. Gregory and Dr. Conolly of London, Mr. Cros Norwich, &c.,** and that according to popular b it was the remains of these severe epizootics that Jenner found in Gloucestershire, which being con nicated to the milkers, rendered them insusceptib small-pox.

Many German authors likewise, who of late y have described the rinderpest, allude to the freq

* See "Observ. on the Distemper now raging among the Cow-kind," by Dr. Mortimer, Sec. R. S., *Philos. Trans.*, vol. xliii. p. 554.

† Opera Omnia, Genevæ, 1716, p. 778.

* De Bovilla Peste, Romæ, 1715, p. 155 and pp. 186 an

† Philosoph. Trans., 1745, vol. xliii. p. 554.

‡ Essay on the Mortality among the Horned Cattle, Lon 1746, p. 33.

§ Philosoph. Trans., 1758, vol. l. p. 531.

‖ See, for example, "The Science and Practice of Medic by W. Aitken, M.D., 2nd edit., 1863, vol. i. p. 259.

¶ Philosoph. Trans., vol. lxx. pp. 543, 544.

** Report of the Section of the Provincial Medical and gical Association appointed to inquire into the State of Vacc tion, read at Liverpool, July 25th 1839.

ance of a scabby or pustular eruption ("das reten eines schuppigen oder pustulösen Aus- ages"), and remark that it is sometimes the rominent symptom of the disorder.*

h these and many like observations on record urprising that the eruption should have been g overlooked in the present epizootic. Mr. of Aylesbury, who has done more than any lual since the days of Jenner to advance nowledge of vaccination, was, I believe, the o call attention to the frequent mention of an on over the entire skin by the physicians of entury, and to insist on the necessity for its l examination. It is now ascertained that st cases of Cattle Plague, not fatal within or four days, there is an eruption on the hide in respects resembling that of small-pox, and from llowing considerations it will appear that the on is far from being the only character in which pest resembles human variola.

The eruption.—Small-pox is the only acute gious exanthem in man that assumes a pustular The eruption in rinderpest also consists of I think may fairly be designated pustules cabs. The differences between the two erup- may be accounted for by differences in the of men and cattle, and are scarcely, if at all, r than the differences between certain varieties e eruption of human variola. In both cases the ion extends from the skin to the interior of the n and nostrils; in both the pustules and scabs receded or accompanied by patches of roseola *eola variolosa*"); in both they are occasionally persed with petechiæ; and in both they some- leave behind pitted scars and discolourations on tis.†

is not contended that the eruption of rinderpest every respect identical with the typical eruption man variola. First, I have never seen anything distinct vesicles. Even in the human subject, ver, we rarely find vesicles in parts of the skin ed by hair. According to Neligan "when a sicular eruption occurs upon the scalp there no apparent vesicle."‡ Professor Spooner also ms me that the skin of bovine animals is less ptible to the formation of vesicles than that of and that it is very difficult to excite in it anything vesication by means of irritants, which can be with comparative ease in the horse. Arguments, efore, derived from the appearances of the cuta- s eruption in man and other animals § are not tly applicable to cattle. Secondly, the thick ue yellow fluid found in the pustules and be- h the scabs may contain no true pus corpuscles. corpuscles, however, are not necessarily present he contents of the ripe pustules of human variola, ch may "consist entirely of epidermic scales, the ajority of normal aspect, but some filled with anular matter, hiding from view the usual nu- eus."‖ Moreover, it is now generally acknow- ed that in epidermal suppuration the pus is ved from the pre-existing epidermal cells.¶ The lear bodies found beneath the scabs of cattle plague resemble imperfectly developed pus corpuscles, and some of them occasionally present all the characteristics of perfect pus corpuscles. But thirdly, as already stated, the brownish scabs are probably in many instances formed independently of anything like well developed pustules. Still, even in the absence of distinct pustules, it seems to me that an epidermal scab, separated from the subjacent cutis by an opaque yellow fluid, which is composed of altered epidermal cells, nuclear bodies, and granular matter, and which occasionally contains true pus corpuscles, comes properly under the category of a pustular eruption. The structure of the scabs, and the pits which they often leave behind on removal, militate against the view that they are simply a secretion of the sebaceous glands, and suggest their analogy to the scabs and crusts of small-pox.

Lastly, although important differences unquestionably exist between the eruption of cattle-plague and that of small-pox, it must not be forgotten that the virus of variola, like all other animal poisons, may assume very different aspects, which are apt to confuse observers who look to results rather than to the primary cause. One illustration, having a most important bearing on the subject under discussion, may be cited. The eruption of rinderpest is believed by some observers to be of a purely aphthous character. Now French experimenters have recently shown that true vaccine pustules may be produced on the udder of a cow by inoculation with matter taken from an "*aphthous* "*stomatitis*" occurring in the horse. Children were successfully vaccinated from the eruption thus induced in the cow. The conclusion arrived at by several eminent members of the French Academy of Medicine was that "the *maladie aphtheuse*, as it is described "by several modern writers on veterinary medicine, "is nothing else than variola."*

2. The other prominent symptoms of rinderpest are also those of small-pox, viz., pyrexia, lumbar pain, salivation and running from the nostrils, alvine flux, albuminuria and hæmaturia, and the "typhoid state." Diarrhœa is not invariably present in rinderpest, and is far from being uncommon in small-pox, particularly in certain epidemics.† At all times it is admitted to be as certain a symptom of confluent small-pox in children as salivation is in adults. In both diseases it is regarded as beneficial rather than detrimental. It is interesting to observe that the general symptoms of ovine variola are the same as those of rinderpest. "The infected sheep separate themselves from their "fellows, and mostly lie down in a remote corner of "the field; they exhibit a peculiar dejected condi- "tion, the head is held low, the ears are pendent, the "breathing is quick and short, the eyelids are swollen, "and tears trickle down the face; the conjunctiva "varies in shade from a bright scarlet to a modena "red; a mucous discharge flows from the nostrils, "and increases in viscosity as the disease advances, "often becoming sanguineous in the latter stages; "* * * the pulse early gives evidence of febrile "excitation; * * * rumination is suspended, and "all food refused; but the patients show a great dis- "position to take water. The alvine evacuations are "but little changed in the majority of cases; in some, "however, diarrhœa succeeds to a torpid condition of "the bowels."‡

3. The anatomical lesions of the internal organs in rinderpest and unmodified small-pox are identical, viz., congestion or inflammation of the mucous membranes of the air passages and digestive canal, patches of ecchymosis and even gangrene of the stomachs and other mucous surfaces, and dark-coloured blood. Every writer on small-pox alludes to the frequent occurrence in that disease of inflammation of the respiratory passages. "The condition of the larynx and trachea,"

Lehrbuch der Path. und Therap. der Hausthiere, von Dr. . Röll. Wien., 1860, p. 356.

A detailed description of the eruption will be found in mer part of this report.

Treatise on Diseases of the Skin, 2nd ed. 1866, p. 17.

The eruption of ovine variola is very different from that of erpest, but also differs remarkably from that of human ola. The papules, in place of being small and acuminated, are rge as a fourpenny piece, or even a shilling, and flattened; the vesicles rarely pass into pustules. According to Pro- r Simonds, "The formation of pustules ought to be regarded ther as an adventitious than an essential feature of the sease."—*Simonds on Variola Ovina*, Lond., 1848, pp. 77–80. ust also be borne in mind that the so-called ovine variola is ibly a distinct species of disease from human or vaccine ola. It is very doubtful if it is possible to communicate it ny other animal than the sheep, while the variolation or cination of sheep, even when successful, protects them in way from "ovine variola."

Clinical Lectures, by Dr. T. K. Chambers, 3rd ed., p. 118.

Cellular Pathology, Chance's Transl., p. 447.

* Gaz. Méd. de Paris, Nov. and Dec. 1863, and Brit. and For. Med. Chir. Rev., January 1864, p. 258.

† See "Elements of Practice of Physic," by David Craigie, M.D., 1836, vol. i. p. 542.

‡ Simonds, *op. cit.*, p. 82.

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says Dr. G. Gregory, "in small-pox, on the eighth "day, is unique. The mucous membrane, if then "inspected, appears covered with a copious, viscid, "puriform secretion, of a grey or brownish colour. "On detaching this, the membrane itself is seen "deeply congested with blood, thickened, pulpy, and, "in the worst cases, black and sloughy, exhaling a "most offensive odour. These appearances may be "traced to the third division of the bronchial tubes."* Dr. Craigie also speaks of the interior of the larynx being occasionally "covered with fragments of white "membranous coating."† Wrisberg found in most bodies of persons dead of small-pox the mucous membrane of the whole alimentary canal inflamed, in many affected by gangrene and sphacelus, so that large patches were abraded, or converted into dingy coloured eschars. He speaks also of the intestines as studded with numerous petechial spots, containing dissolved blood extravasated into the cellular tissue.‡ In several of the autopsies of small-pox recorded by Reil, the mucous membrane of the stomach and intestines is described as inflamed and gangrenous looking, and mottled with petechiæ and patches of ecchymosis.§ Dr. Morehead also has recorded the autopsy of a case of small-pox with gastritis, where the inner surface of the stomach was coated with lymph, which could be peeled off as a distinct layer.‖ In another case, recorded by Dr. McPherson, "the colour was on the "eve of gangrene, and studded with small conical "ulcers."¶ Dr. Craigie describes the genito-urinary mucous membrane in small-pox as reddened and injected, and Reil states that it may even present patches of gangrene. Lastly, it may be added that in the bodies of several persons who have died of malignant small-pox in the London Fever Hospital, I have found the respiratory, the alimentary, and the genito-urinary mucous membranes all intensely inflamed, and studded with petechiæ and large patches of ecchymosis. The resemblance of these lesions of variola to those of rinderpest described in a former part of this report is so obvious as to require no comment. It must be borne in mind that the remarkable patches of ecchymosis and gangrene found in the third and fourth stomachs of animals that have died of the Cattle Plague are far from being invariably present in that disease. Of the stomachs of eight animals examined by me on one day, in only one was there any trace of ulceration or gangrene. It is important to add that in sheep affected with *variola ovina* the mucous membrane of the fourth stomach or *abomasum* "is in some cases infiltrated with "blood and ecchymosed."**

4. In both rinderpest and small-pox the duration of the pyrexial stage is on an average about eight days.

5. In both diseases a peculiar offensive odour is exhaled from the body before and after death. The perspiration and other secretions of healthy cattle smell very differently from those of man, so that we can readily understand how the same disease may generate very different odours in the two animals. It may be mentioned that a medical correspondent in the country compared the smell of rinderpest to that of human variola weeks before he was aware of the intimate resemblance of the two maladies. The remarkable fact, however, is that any peculiar odour at all is given off in the two diseases.

6. The two diseases resemble one another in their extreme contagiousness, and in the facility with which the poison is transmitted by fomites.

7. Both diseases can be easily propagated by inoculation. In both cases the inoculated disease is milder and less fatal than that resulting from infection.

8. In both diseases there is a period of incubation which is shorter when the poison has been introduced by inoculation than when it has been received by infection.

9. Vaccinated persons are constantly exposed to small-pox poison with impunity; and with regard to rinderpest, there are numerous instances in which individual cattle or entire herds have appeared to lead charmed lives in the midst of surrounding pestilence. This last fact has never been explained, but it would be readily accounted for on the supposition that rinderpest was the equivalent of small-pox, and that the cattle who have enjoyed the immunity from it had previously suffered from ordinary cow-pock.

10. It is a mistake to imagine that *variolæ vaccinæ* is of necessity a mild disease. Under ordinary circumstances it undoubtedly is so. But there are many epizootics of cow-pock on record, particularly in India, where the disease was of a malignant character, and destroyed the cattle almost as extensively as small-pox did the human race. Cattle in Bengal have long been subject to a malignant small-pox, and it is a significant fact that the natives designate it by the same terms as human variola, viz. *bussunt*, *mhata*, or *gotee*. Mr. Gibson, in a "Sketch "of the Province of Guzerat," published in 1838, after speaking of the great prevalence of human variola remarks: "The same disease is at times very fatal "among cattle, they become so weak and feverish as "to be unable to eat in consequence of the effects of "the pustular eruption on the lips, tongue, and "throat."* English medical men in India have frequently noticed that the human and bovine diseases prevail at the same time, and have come to the conclusion that "variola and *mhata* or *gotee* owe their "origin to the same cause." The Committee of the Provincial Medical and Surgical Association, in their report on vaccination already referred to, maintain that the malignant distemper among cattle, so common in India, is the same disease as that described by Ramazzini and other Italian writers in the early part of last century; and its resemblance to modern rinderpest is shown further by the fact, that in the reports of small-pox in India I have frequently found statements similar to that here quoted from Mr. Monteith, the head of a large tannery in Sealdah, viz., that the hides of cattle dying of the disease "are "of less value on account of being marked from brand "sores, &c."† The following symptoms of mhata, as observed by Mr. G. G. Macpherson of Moorshedabad, in 1832, and by Mr. Lamb of Dacca in 1836, leave little doubt of their similarity to those of rinderpest: "The animals which were at first affected had been "for a day or two previously dull and stupid; they "were afterwards seized with distressing cough, and "much phlegm collected in the mouth and fauces. "The animals had at this time apparently no inclination "tion for food." "There is a discharge of saliva "from the mouth; then follows universal tremor, "with great heat of the head, chest, and body as far "back as the loins, while the hind quarters are cold. "The whole body then becomes hot, and the animal "suffers from intense thirst." "The mouth and "fauces appeared to be the principal seat of the "disease, being in some instances one mass of ulcer-

* Lectures on the Eruptive Fevers, 1843, p. 55.

† Craigie, *op. cit.*, i. p. 554.

‡ "In plerisque cadaveribus villosa totius canalis alimentaris inflammata fuit, in multis gangræna et sphacelo correpta, ut magna villosæ frustula abrasa essent, aut in luridas escharas, uti in dysenteriis, mutata. * * * In multis cadaveribus copiosæ intermixtæ erant maculæ petechiales variæ magnitudinis et coloris, sæpe fusci, sanguinem gangræna resolutum, et vere in cellulosam nerveæ tunicæ extravasatum continentes.—*Wrisberg, Comment*, vol. i. p. 77.

§ "Aperto abdomine, amplæ jejuni partes fusco et nigricante colore notatæ conspiciebantur. Gangrænosum intestinum te videre crederes, nisi illud reclusum omnino superius, quo duodeno nectitur, cum spissa, viscida, et atro-viridi pulte oblita, repertum esset, quæ in transparentibus parietibus maculas nigricantes extrorsum formabat."—*Reil, Memorabil. Clin. Fasc.*, iii. p. 121.

‖ Clin. Res. on Disease in India, 1st ed., 1856, i. p. 321.

¶ Report on Small-pox in Calcutta, by Dr. Duncan Stewart, 1844, p. 82.

** Simonds, *op. cit.*, p. 89.

* Trans. of Med. and Phys. Soc. of Bombay, vol. i. 183 p. 70.

† Report on Small-pox in Calcutta, by Duncan Stewa M.D., 1844, p. 107.

ation." "On the fifth day the eruption appears about the udder, sometimes only a few pustules, at other times they are numerous and confluent; but the result of the attack does not seem much dependent on the eruption. Whether the pustules are numerous or rare, the disease is almost equally fatal, and unless measures are taken to separate the diseased from the healthy, it speedily runs through the whole herd, sparing few. In those who do escape, after taking the infection, the favourable symptom is a spontaneous diarrhœa, in which the dejections are large, watery, and offensive. When the hair is rubbed off after the pustules have appeared at the udders, the skin is found covered with sores. Many die before the eruption makes its appearance, but the fever is known by the discharge of the saliva, &c." * It may be argued that disease among the cattle in India is not variola, but different disease, "rinderpest." That it is really small-pox is proved by the fact that human beings have frequently been inoculated with the virus, and that the result has been either cow-pock or severe and even fatal small-pox. In 1837, Mr. Brown, a surgeon in Siam, inoculated four children with matter taken from a cattle labouring under a very severe epizootic of *Lampas*. He made use of the "scales or scabs taken from the back or abdomen," reducing them to a paste with water. "In all four, vesicles in every respect resembling, in their progress and when mature, genuine vaccina made their appearance, and went through the same regular course; the constitutional disturbance on the eighth day only being more severe than I have usually seen it in the latter. From these many other native children were inoculated, and no doubts of the genuineness of the lymph were excited until two English children were punctured from one of them, and it was then found that small-pox supervened in both of these cases; and this was more than suspected to have happened in many of the native children, who had generally dispersed a few days after the operation, and were not afterwards heard of. One of the English children unhappily died."† In 1837 another series of inoculations was performed (by Mr. Macpherson, in Bengal) with virus from diseased cows, on which occasion an eruptive complaint of the true variolous nature was produced." The same phenomena were observed at Gowalpara by Dr. Wood. "In several of his cases the symptoms were so severe as to excite apprehension that the disease would terminate fatally. He was so strongly impressed with this fact, that he thought it would be better to take human small-pox rather than cow small-pox for inoculation, when the latter assumes its dangerous and fatal form."‡ This severe form of small-pox in cattle is not altogether unknown in England. An instance which occurred at a dairy in Gloucestershire in 1825 may be cited. "The veterinary surgeon who saw it, described it as an aggravated case of cow-pox; the whole skin, from the base of the horn to the end of the tail and to the hoofs, being covered with the disease. It destroyed the animal, and spread through all the other cows in the dairy, between 40 and 50 in number."§

It is generally conceded that human variola and vaccinary vaccinia are essentially the same disease. The researches of Mr. Ceely of Aylesbury and Mr. Simcock of Brighton seem to place this beyond a doubt. They have shown that when cattle are inoculated or infected with human variola the result is ordinary vaccinia, and that when men are inoculated back again with this vaccine matter, they are in future protected from small-pox. Here then we have the same disease assuming two very different forms—a mild and a severe one—in man. From the evidence above given, it would seem that the same thing occurs in cattle. Two circumstances seem to contribute to make small-pox assume the mild form. 1. The introduction of the poison by inoculation instead of by infection. The knowledge of this fact was the foundation of the old practice of inoculation for small-pox. 2. The main cause, however, is the transmission of the poison from one species of animal to another. We know that human variola produces in the cow ordinary vaccinia, and there are grounds for believing that the vaccinia of the cow came originally from the horse. So also rinderpest, when communicated to sheep and other animals, produces a less fatal disease than in cattle; and the malignant small-pox of Indian cattle produces in man sometimes undoubted variola, but at other times merely ordinary vaccinia.

11. It is a well-known fact that of late years ordinary cow-pock has become so rare in this country that it has been difficult to obtain lymph direct from the cow for the purpose of human vaccination. Hence the majority of the cattle in these kingdoms are probably less protected than formerly from the invasion of small-pox in a severe form.

12. The view that rinderpest is simply bovine small-pox may be objected to, on the ground that there is no proof that it has communicated small-pox to the human subject, and that, in fact, human small-pox is far less prevalent in Britain than it was a few years ago, when there was no rinderpest. Evidence, however, of the transmission of rinderpest to the human subject is not altogether wanting. In the case, of which the particulars are here annexed, and for an opportunity of seeing which I am indebted to Dr. Quain, a vesicle presenting the appearances and running the ordinary course of vaccinia was apparently produced in the human subject by the inoculation of rinderpest matter.

Mr. Hancock, aged 30, veterinary inspector of the Uxbridge district, was accidentally punctured on the back of the hand on Dec. 3rd, 1865, while superintending the *post-mortem* examination of a bullock, dead of the plague. The wound was inflicted with a knife, with which his assistant was engaged in removing the skin from near the scrotum. It did not bleed. On Dec. 8th, or the fifth day, a small elevated pimple could be seen and felt at the site of the puncture. On Dec. 12th this pimple was converted into a distinct vesicle, and at the same time Mr. H. began to suffer from headache, pains in the back and limbs, and acceleration of the pulse. On the following day he consulted Mr. Rayner, of Uxbridge, who found a vesicle like that of vaccinia on the ninth day, full of clear lymph, its edges elevated, its centre depressed, and of a brownish colour, and the whole surrounded by a red areola. The swelling extended for some way up the arm; the lymphatic vessels were inflamed; and there was pain in the arm-pit. On Dec. 15th and 16th the constitutional symptoms increased in severity, and his sufferings were great, from rending pains in the head and back. From the first Mr. Rayner had no hesitation in pronouncing the case to be one of vaccinia, and did not fail to recognize its importance. On Dec. 18th, or the fifteenth day, Mr. H. came to town, and saw Professor Spooner, who also recognized the vaccine character of the vesicle. He then came to Dr. Quain's, who was good enough to ask me to see him. The constitutional symptoms had then subsided, but there was still a large vesicle measuring about an inch in its long diameter, and a third of an inch across, filled with slightly turbid brownish fluid, its centre brownish and depressed, its margin puckered and irregular, and its base hard and inflamed, with a well-marked red areola about three inches in diameter. The appearances at once suggested to Dr. Quain and myself a receding vaccine vesicle. On Dec. 20th this opinion was stamped with the high authority of Mr. Ceely. On Jan. 1st and 2nd, 1866, I again saw Mr. Hancock. The appearances had now changed.

* Trans. Med. and Phys. Soc. of Calcutta.
† Report on Small-pox in Calcutta, by Duncan Stewart, 1844, p. 148.
‡ Rep. of Section of Prov. Med. and Surg. Assoc. already referred to, p. 18.
§ Ibid.

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There had been no suppuration, but there was a dry, black, depressed crust, with a pink, elevated, translucent, vesicated margin, and a surrounding reddish halo. On Jan. 2nd Mr. H. exhibited his hand at the Pathological Society at the instance of Dr. Quain, who pointed out that the appearances were almost identical with the declining vaccine vesicle on the temporal region figured in Plate I. of Mr. Ceely's "Further Observations on the Variolæ Vaccinæ."* It is necessary to add that Mr. H. had been vaccinated in infancy, and had one good vaccination mark on his arm.†

The unusual duration and size of the vesicle in this case were the only points in which it differed from ordinary vaccinia, but it may be mentioned that cases of vaccinia have been recorded by Mr. Ceely, in which the vesicles did not desiccate until the 17th day, and the crusts did not separate until the 24th. The appearances as well as the entire history of this case were very different from the results of an ordinary poisoned wound, but coincided with those observed after vaccination. It is to be regretted that no lymph was obtained from the vesicle sufficiently early to test fairly its power of propagating the disease. Some obtained on December 19th, sixteenth day, for which I am indebted to Professor Spooner, has been made the subject of experiment, with negative results. Hitherto this remarkable case stands alone. On the supposition that Cattle Plague is small-pox, the immunity of human beings at the present day might be attributed to the protection conferred by vaccination, or by a previous attack of small-pox. But it is justly contended that a like immunity was enjoyed long before the days of Jenner, or even of inoculation. The authors who at the beginning of last century described the history of the Cattle Plague with such remarkable fidelity and minuteness are silent as regards its communicability to man, if they do not expressly state that those persons who were brought into the most intimate contact with the diseased cattle suffered nothing. It is well known, however, that great difficulty is often experienced in transmitting an acute specific disease from one species of animal to another, although it can be propagated readily enough amongst animals of the same species. The rinderpest itself, notwithstanding the assertions to the contrary, made when it first appeared among us,‡ is transmissible to sheep, goats, and deer; yet there is more difficulty in communicating it to these animals than from cow to cow. The small-pox of sheep affords another remarkable illustration of this law. Of 250 inoculations (punctures) with the virus of sheep-pox in the human subject by Mr. Marson and Mr. Ceely, not one succeeded. Mr. Ceely observes: "I ovinated 25 subjects whose ages ranged from "three to fifteen years, some twice and thrice over. "In none were there fewer than *six punctures* each "time, making not less than 180 punctures. No "specific disease resulted. * * * Nearly all the "above subjects were shortly afterwards vaccinated "with current vaccine lymph, which in each case ex-"hibited the normal effects. I may as well add also, "that the same kind of ovine virus, which did not "succeed in children, took promptly on sheep."§

More than this. The experiments of Mr. Ceely, Mr Marson, and Professor Simonds, conducted on a mos extensive scale, show that sheep-pox is not only no transmissible to man, but cannot be propagated to an other animal than the sheep. It may be said, however that what applies to sheep does not apply to cattle because we know that ordinary cow-pock is easily transmissible from the cow to man. But, first, it must b remembered that ordinary cow-pock is transmissible t the human subject solely by means of inoculation There is no evidence that the poison can be propa gated through the atmosphere; and, secondly, th same remark applies to that severe and fatal disease of Indian cattle already referred to, which in it symptoms corresponds in every respect with rinder pest, and which has been proved by experiment to b identical with human variola. "It is an extraordinar "fact," says Mr. G. G. Macpherson of Moorshed bad, writing in December 1832, "and worthy o "remark, that while the cows were thus affected, n "case of variola amongst the natives in the villag "presented itself; and although the people wer "averse from handling or going much among th "cattle at the time of disease, still they all scoute "the idea of infection, stating that they had neve "heard of any one contracting the disease from th "cow."* It is, therefore, in no way surprising, eve on the supposition that rinderpest is a form of smal pox, that human beings have not suffered from it but it is not unreasonable to expect that inoculation of human beings, unprotected by vaccination or by previous attack of small-pox, with the virus of rinder pest, may now and then produce results similar t those obtained in India by Messrs. Macpherso Brown, and Furnell, and to those recently observed i this country in the case of Mr. Hancock. It is n to be imagined, however, that such experiments w succeed, except in a small fraction of cases. Th singularity of Mr. Hancock's case must be viewed i connexion with the fact that it is extremely difficu to inoculate cattle, even when unprotected by pr vious cow-pock, with the virus of human variol According to the most practised inoculators of th country, Mr. Ceely and Mr. Badcock (although ce tain French experimenters appear to have been mo successful), success is not attained once in fifty case It is a remarkable fact that ordinary cow-pock easily transmissible from the cow to man, and fro man to the cow, but that the severe form of variol whether in man or in the cow, seems to be tran mitted from the one species to the other with th greatest difficulty.

These considerations are not adduced with th object of proving that rinderpest and variola a absolutely identical, or even pathological equivalen Apart, however, from their general interest, th unquestionably point to a very close analogy betwe the two diseases, and indicate the necessity for fu ther inquiries of an experimental character, whi can alone decide the matter. These inquiries oug to have the following objects:—

1. To ascertain if cattle which have suffered fro ordinary vaccinia are in any way protected from th Cattle Plague.

2. To ascertain if cattle which have been succes fully vaccinated with vaccine lymph, or inoculat with the matter of human small-pox, acquire immuni from the Cattle Plague, or contract the disease in modified form.

3. To ascertain if cattle which have passed throu the Cattle Plague are incapable of being vaccinat either by vaccine lymph or by the matter of hum small-pox.

4. To ascertain if human beings inoculated wi the matter of Cattle Plague present phenomena simil to those observed in Mr. Hancock's case, and if t disease so induced be capable of propagation.

* Trans. Prov. Med. and Surg. Assoc., vol. x., 1842.

† The eruption communicated by cows during labour to veterinary surgeons, referred to and figured by Mr. Gamgee in the first number of the "*Edinburgh Veterinary Review*" (July 1858), consisted of a number of pustules similar to ecthyma, and had no resemblance to what was observed on Mr. Hancock's hand. The appearances of the vesicle, at different stages, in this case, are represented in the figures (Plates XII. and XIII.) accompanying Mr. Ceely's memorandum. See p. 80.

‡ It has long been known in Germany that the Cattle Plague is communicable both by infection and inoculation to sheep, and from sheep again to cattle. See *Schmidt's Jahrbuch der gesammt. Med.*, 1863, No. 118, p. 231, and 1864, No. 123, p. 122; also *Dict. des Sc. Méd.*, 1815, art. "Epizootie," p. 24. The observations recently made in this country show that the disease is communicable to many other animals besides sheep.

§ Simonds on Variola Ovina, 1848, p. 154.

* Trans. Med. and Phys. Soc. of Calcutta.

I am happy to be able to add that investigations of e nature here indicated have recently been com- nced in various parts of the country. Whatever the results of these investigations, a question hich has long agitated medical opinion will be ally solved, and if the results turn out, as there are ne grounds for hoping, mankind will be furnished th a certain remedy for arresting the ravages of e Cattle Plague.

The foregoing remarks may be summed up as lows :—

1. The Cattle Plague now prevalent in Britain is e same disease as the *rinderpest* of German iters.

2. The chief symptoms of the disease are, fever th general depression, an aphthous condition of e interior of the mouth and nostrils, an eruption mposed of roseolar patches, scabs, and sometimes pus- es and petechiæ on the skin, running from the eyes, strils, and mouth, suppression of milk, constipation owed by diarrhœa, albuminuria, and hæmaturia, d the ultimate development of a condition similar the "typhoid state" of human maladies.

3. The chief morbid conditions found after death , the eruptions on the skin and in the interior of mouth, catarrhal or croupal inflammation, and n gangrene, of the mucous membranes, ecchymoses, unusually dark colour of the blood, a peculiar our, and great proneness to decomposition.

4. There is no resemblance whatever between Cattle gue and the typhoid or enteric fever of man, in ir anatomical lesions, their clinical history, or their ology. All arguments derived from the supposed ntity of these two maladies are therefore baseless.

5. Cattle Plague is equally distinct from human hus, scarlet fever, erysipelas, influenza, or dysen- y

6. Cattle Plague belongs unquestionably to the ne class of diseases as the human exanthemata, such variola, scarlatina, and rubeola.

7. Small-pox is the human malady which it most ely resembles. This resemblance holds good, not ely, to a great extent, in the cutaneous eruptions the two diseases, but in their symptoms and ana- ical lesions, and in their extreme contagiousness capability of propagation by inoculation.

8. The resemblance between rinderpest and variola fficiently striking to demand immediate inquiry, ether vaccination or an attack of ordinary cow-pock fers future immunity from rinderpest, or modifies course. The result of such an experimental in- y can alone determine the identity or non-identity he two diseases ; but if the reply to the inquiry be he affirmative, a certain method of arresting the ead of the Cattle Plague will be placed in our ds.

C. Murchison.

nd January 1866.

Supplement.

SINCE the date of the above Report, vaccination of le has been extensively tried. The experiment has wn that with lymph from a child's arm it is much er to obtain characteristic vaccine vesicles in cattle than generally imagined. In many instances successful cination seemed to confer temporary immunity from Cattle Plague; for in certain herds the vaccinated le, and they alone, escaped the disease. Further ex- ence, however, has proved that this immunity, if real, is very transient. Cattle that have been successfully vaccinated, and in which the vaccination has run its course, when brought in contact with animals suffering from cattle plague, or when inoculated with the virus of cattle plague, have contracted the disease and died of it. One case in illustration may be mentioned. Two cows successfully vaccinated in the country by Mr. Acton, were brought to the Royal Veterinary College to be experimented on by Professor Varnell. One of these cows had still three good vaccine vesicles by the side of the vulva on arrival. On January 20, one of these cows was inoculated with the virus of Cattle Plague, taken from a calf in which the disease had been induced by inoculation with diluted virus taken from a sheep affected with Cattle Plague. The other cow was shut up in a loose box with the same calf. The calf died within 24 hours. On January 25th, or the sixth day after inoculation, the inoculated cow was seized with symptoms of Cattle Plague and died on January 30th. On January 26th or the seventh day from exposure, the second cow was taken ill, and died on February 2nd. The obvious inference is that, notwithstanding the close analogies between the cattle plague and human small-pox, the former disease, like the so called small-pox of sheep, is uninfluenced, by ordinary vaccinia, and like it, therefore, is, in all probability a distinct species of disease from human small-pox.

C. Murchison.

30th January 1866.

Notes of the History of the Case of Mr. Henry Hancock, Veterinary Surgeon and Inspector, Uxbridge. (Drawn up by Robert Ceely, Esq.)

On the 3d December 1865 Mr. Henry Hancock, Veterinary Inspector, Uxbridge, was engaged in superintending the autopsy of a bullock recently dead of Cattle Plague. His assistant, who was performing the operation, while occupied in removing the skin from the scrotum, accidentally punctured the back of Mr. Hancock's hand with the point of the knife. The puncture being slight was disregarded at the time, but was washed as soon as practicable and thought of no more. On the 8th, five days afterwards, a small, slightly-elevated, hard pimple was felt and seen on the site of the puncture. This gradually advanced till the ninth day from the puncture, the fourth from papulation, when the enlarged pimple became distinctly vesicular. At that time there were but slight constitutional symptons. On the next day, the tenth from the receipt of the puncture, the fifth of papulation, and the second of vesiculation, he called upon his surgeon, Mr. Rayner, of Uxbridge, who, on seeing the hand, inquired "if the patient had been handling the "udder of a cow, for that he could recognize a cow pock "vesicle of the ninth day?" The vesicle was then distended with limpid lymph, its margin elevated and rather brown, centre depressed and rather brown, and was surrounded with a large bright red areola. There was then considerable tumefaction, extending from the knuckles above the wrist. The absorbent vessels were visibly inflamed; they and the axillary glands were tender and painful.

The pulse, naturally slow, was accelerated. There was much pain in the back and limbs, severe and distracting head-ache, anorexia, &c., &c., all of which symptoms continued to increase during the two following days. At the end of that time the diffused areola had extended as far as the elbow.

On the 18th December, fifteen days after the puncture and ten days after papulation, the patient was seen in London by Drs. Quain and Murchison and by Professors Spooner and Simonds.

The local inflammation and the constitutional symptoms had then partially subsided. The vesicle contained a rather turbid brownish fluid, and there were present all the indications of a declining vaccine vesicle.

The above particulars were detailed to me by Mr. Hancock and Mr. Rayner, on my visit to them at Uxbridge on the 20th December. And on my exhibiting the different phases of the vaccine vesicle on the hand of a milker, depicted in plates 3, 4, and 5 of "Further Observations on the Variolæ Vaccinæ" (Transactions of the Provincial Medical and Surgical Association, Vol. X.), Mr. Hancock immediately recognized their exact correspondence with those which had occurred on his hand.

On this day, 20th December, being the eighteenth of puncturation and the thirteenth of papulation, I observed manifest declining œdema of the integuments on the back

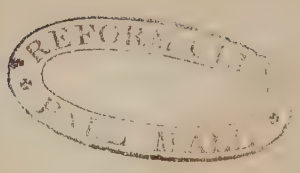
of the hand and as far as the elbow, with slight patches here and there of declining redness near it. The vesicle, which had been many days poulticed, was depressed in the centre, puckered at its margin, but still raised on a palpably firm base. It certainly exhibited the appearances I have often seen, at a corresponding stage, on the loose vascular skin of the back of the hand of milkers affected with casual cow pox. A similar vesicle I have depicted in plate 5, fig. 2, in the work above referred to.

The conclusion drawn from the appearance of the vesicle at this time was fortified by a consideration of the history of its development. The late appearance after the puncture, the tardy and gradual papulation and vesiculation, the period of the advent of the areola, its progress, extent, and period of decline, all corresponding to those phenomena resulting from the casual inoculation of the milker by the cow affected with vaccinia.

I could not, however, but regret that lymph was not abstracted at the proper time, with a view to exclude all doubt as to its actual character.*

R. C.

* The vesicle, at different stages, is represented in Plates XII. and XIII.



Explanation of Coloured Drawings.

Plate I.

Fig. 1.—Portion of small intestine of a healthy ox, showing the enlarged condition of the solitary glands.

Fig. 2.—Portion of small intestine of a healthy ox, showing the very developed and prominent condition of a Peyer's patch.

Plate II.

Portion of small intestine of a cow on the eighth day of rinderpest. The mucous membrane is intensely inflamed, with small patches of ecchymosis. The solitary glands are enlarged, as in Plate I., fig. 1. Peyer's patch is much less prominent than in Plate I., fig. 2, and is paler than the surrounding mucous membrane. At some parts of the patch the glandules are seen to contain a minute drop of pus, at others they are empty.

Plate III.

Portion of small intestine of a cow on the eighth day of rinderpest. Intense inflammation with exudation composed mainly of epithelial structures on mucous surface. All trace of Peyer's patches had disappeared.

Plate IV.

Peyer's patch on tenth day of rinderpest. The patch presents a flattened reticulated aspect. It is not raised above the general level of the mucous membrane, and is free from ulceration.

Plate V.

Portion of human ileum on tenth day of enteric fever, showing the greatly enlarged and very prominent condition of Peyer's patches and of the solitary glands.

Plate VI.

Portion of human ileum on twenty-sixth day of enteric fever, showing extensive ulceration of Peyer's patches.

Plate VII.

Fig. 1.—Cœcum of a cow on eighth day of rinderpest.

Fig. 2.—Portion of fourth stomach close to pylorus of a cow on eighth day of rinderpest, showing intense redness and ecchymosis, superficial erosions, and a partially detached slough of the mucous membrane.

Plate VIII.

Fig. 1.—Portion of fourth stomach of a cow on seventh day of rinderpest, showing intense redness and superficial erosions.

Fig. 2.—Portion of fourth stomach of a cow recovering from rinderpest—about fourteenth day. The discoloured patches were becoming pale again, and had not proceeded to sloughing.

Plate IX.

Portion of fourth stomach of a cow affected with rinderpest. The mucous membrane is red and inflamed, and presents numerous patches of ecchymosis and several deep excavated ulcers, the largest one extending completely through the mucous and muscular coats.

Plate XII.

Appearances presented by Mr. Hancock's hand on December 18th, or 15th day after inoculation with Cattle Plague.

Plate XIII.

Appearances presented by Mr. Hancock's hand on December 23rd, or 20th day, and on January 1st, or 28th day.

Explanation of Plates X. *and* XI. *are given on a separate sheet facing Plate* X.

FIG.1 SMALL INTESTINE OF A HEALTHY OX, SHEWING ENLARGED SOLITARY GLANDS.
FIG.2. SMALL INTESTINE OF A HEALTHY OX, SHEWING GREAT ELEVATION OF PEYER'S PATCH

Dr Murch sculp. Privat

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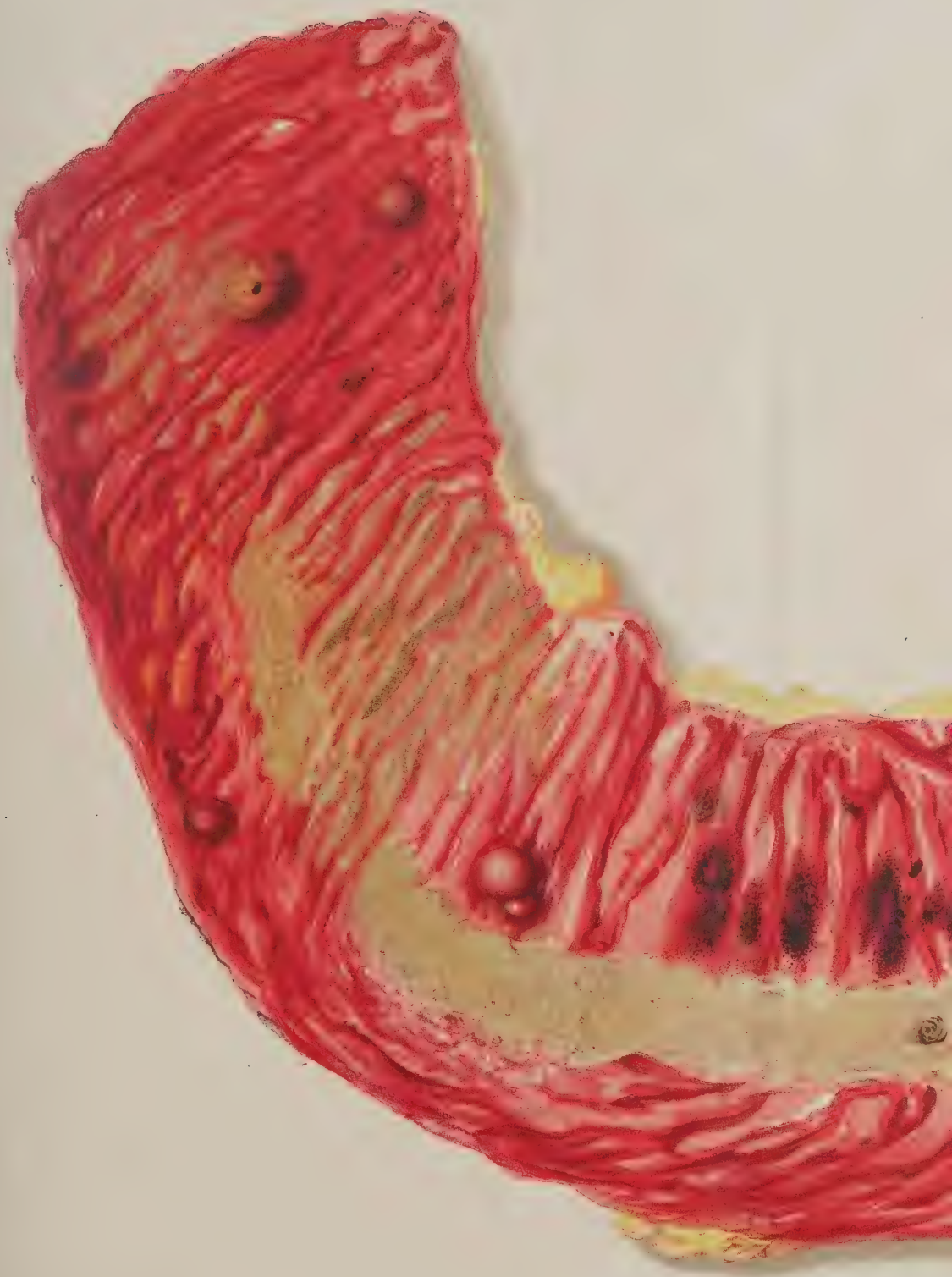

Dr Murchison, Direx.

PORTION OF ILEUM WITH PEYER'S PATC
ON EIGHT

OF SOLITARY GLANDS.

E. Burgess. del. Day & Son, Limited, Lith.

OF ILEUM ON EIGHTH DAY OF CATTLE PLAGUE

ex'

F. Bourgeois del. ... & Son (Limited) Lith

REFORM CLUB
PALL MALL

PORTION OF ILEUM, SHEWING PEYER'S PATCH
ON TENTH DAY OF CATTLE PLAGUE.

E. Burgess del. Day & Son Limited

LOWER END OF HUMAN ILEUM.

OF ENTERIC FEVER

ION IN HUMAN ILEUM ON TWENTY-SIXTH DAY OF ENTERIC FEVER.

REFORM CLUB
PALL MALL

Fig 2

Dr Murchison, Direx.

F. Burgess, del. Day & Son, Lithers to the Queen Lith

FIG. 1. COECUM OF COW ON EIGHTH DAY OF CATTLE-PLAGUE

FIG. 2. PORTION OF FOURTH STOMACH OF COW, ON EIGHTH DAY OF CATTLE-PLAGUE

PLATE VII

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Fig. 2

PORTIONS OF 4TH STOMACH

F. Forgess del Day & Son, Limited

REFORM CLUB

E.Burgess.del. Day & Son Limited lith.

ULCERATION OF FOURTH STOMACH [illegible] FOURTH DAY OF CATTLE-PLAGUE.
SHEWING THE MEMBRANOUS & FOLLICULAR ULCERS.

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Explanation of the Microscopic Drawings.

Plate X.

Fig. 1.—Cells from interior of glandules of a Peyer's patch in a healthy ox.

Fig. 2*a*.—Cells from interior of glandules of a Peyer's patch from a cow on the seventh day of rinderpest. The corpuscles are more granular than in fig. 1.

Fig. 2*b*.—Ditto ditto, treated with acetic acid.

Fig. 3.—Corpuscles from interior of an enlarged solitary gland of the ileum in a healthy ox, into which blood has become extravasated.

Fig. 4.—From ditto ditto. The corpuscles are more granular, and there is more oily matter.

Fig. 5.—From ditto ditto. There is much oily and granular matter, and large compound granular cells and masses.

Fig. 6.—From interior of enlarged solitary gland of the ileum of a cow on the eighth day of rinderpest. The appearances are similar to those seen in fig. 5, with the addition of a crystalline scale of cholesterine.

Plate XI.

Fig. 1.—Epithelium cells, containing much granular matter from aphthous crusts between lower jaw and lip—superficial layer.

Fig. 2.—Nuclear bodies, epithelium cells, and granular matter from aphthous crusts between lower jaw and lip—deep layer.

Fig. 3.—Diagram of perpendicular section through the skin and one of the pustules on the udder. *a*. Cutis. *b*. Epidermis. *c*. Cavity, containing a yellow opaque fluid, bounded above by a thin lamina of cuticle and below by a corresponding depression of the cutis. Magnified three diameters.

Fig. 4.—Epidermal cells containing granules and oil globules, and nuclear bodies composing a scab.

Fig. 5.—Altered epidermal cells, nuclear bodies, true pus corpuscles, and granular matter from yellow opaque fluid contained in cavity represented in Fig. 3.

Fig. 6.—The same after addition of acetic acid.

Fig 1

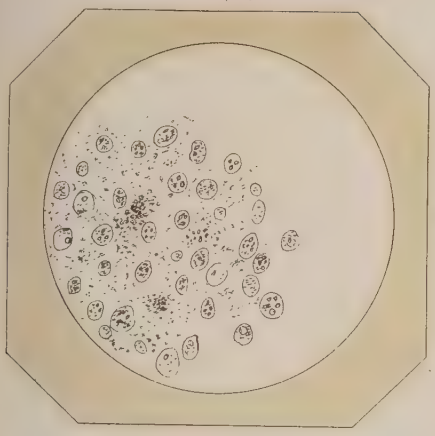

Fig 2

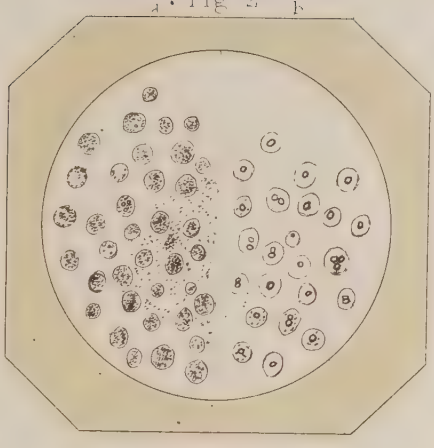

Fig 3

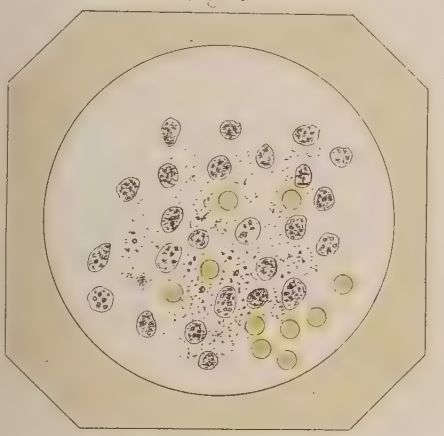

Fig 4

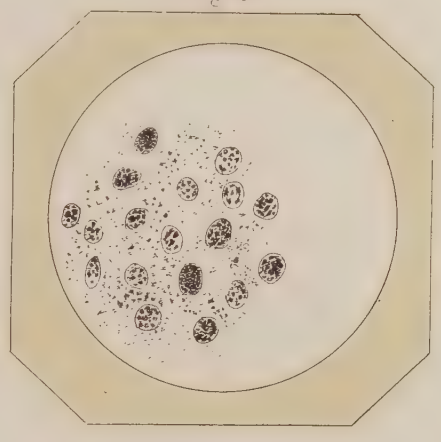

Fig 5

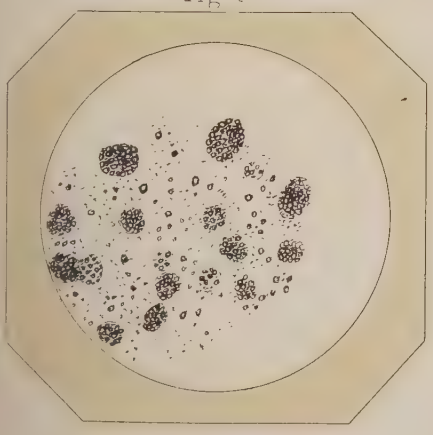

Fig 6

MICROSCOPIC DRAWINGS OF CONTENTS OF INTESTINAL GLANDS OF HEALTHY & DISEASED CATTLE

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Fig 1

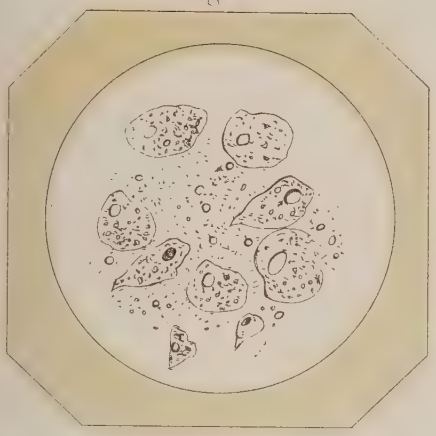


Fig 2

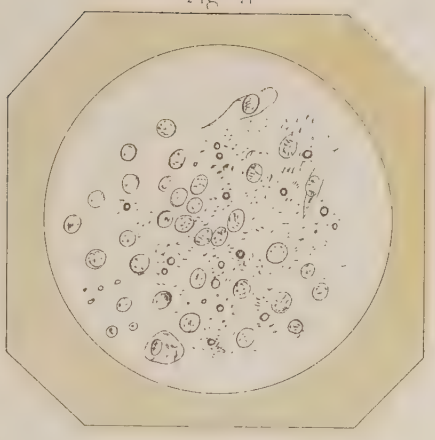


Fig. 3

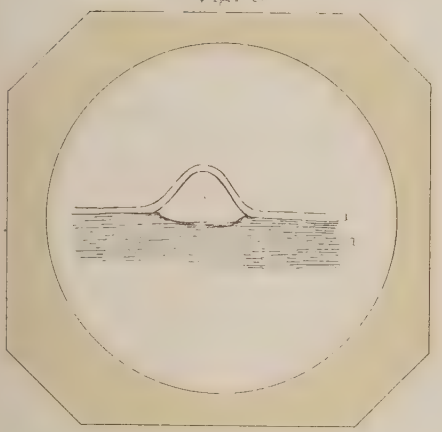


Fig. 4

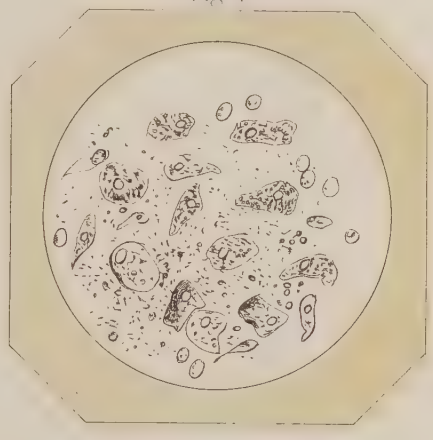


Fig. 5

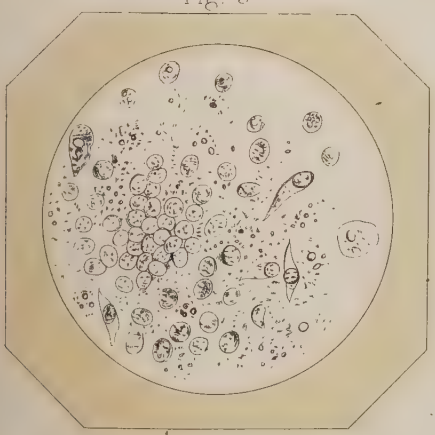
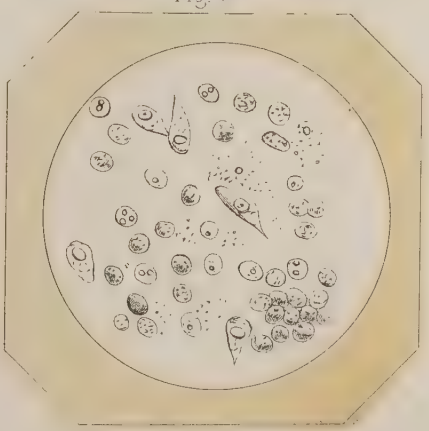


Fig. 6



Day & Son lithographers

MICROSCOPIC DRAWINGS OF ERUPTIONS OF CATTLE PLAGUE

REFORM CLUB
PALL MALL

H.B.Tu...n del. Day & Son (Lit...d)

...HICES PRESENTED BY M^R HANCO...KS HAND... N DEC^R 18T... R FIF...ENTH DAY
AFTER IN...ULATION WITH CATTLE PLAGUE

On Dec^r 23^rd or 20^th day.

On Jan^y 1^st or 28^th day

Jhnson Photo^t

H.B.Tuson.del Day & Son(limited) Lith

APPEARANCES PRESENTED BY M^R HANCOCK'S HAND, AFTER INOCULATION WITH CATTLE PLAGUE

PALL MALL

ROYAL COLLEGE OF PHYSICIANS PALL MALL

On the Morbid Anatomy of the Cattle Plague.

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

JOHN SYER BRISTOWE, M.D., F.R.C.P.,

PHYSICIAN TO AND JOINT LECTURER ON PHYSIOLOGY AT ST. THOMAS'S HOSPITAL.

Dr. Bristowe. Report to Commissioners.

HE following Report is less complete than I could ve wished, but is as complete as the time I have en allowed to devote to it and the opportunities hich I have enjoyed have permitted me to make it. ne careful post-mortem examination of an ox is a ry troublesome and lengthy process, and even with undant assistance is difficult (except under very vourable circumstances) to carry out exhaustively. ese difficulties I have encountered, and they must plain the incompleteness (which I regret) of many the accompanying post-mortem accounts. Accue microscopical examinations again demand a large votion of time, and unfortunately most specimens of little value for this purpose unless they be sh. These two considerations will account for my croscopical investigations having been less extene than I could have desired. I could not hope to ke them complete; and I limited them chiefly, refore, to those tissues in which morbid processes most obvious and, as I think, most important.

The post-mortem records which I have appended my report were (with the exception of microscopi- and some other minute descriptions) mostly taken wn from my dictation while the autopsies to which y relate were in progress, and may be regarded, refore, as fairly accurate reproductions of my imssion of each case at the time of its examination. ese are mainly the basis on which my report has n written. But it is right to add that the report resses my more mature opinions on many points on ch my opinions were unformed at the time the post-tem accounts were written; and that such changes opinion have resulted partly from re-examination specimens which I had kept, partly from the intigation of specimens derived from animals which not been dissected by myself. These remarks ecially apply to my account of the cutaneous otion, which was written after a very careful examination of numerous specimens which I had served. They will explain also any other discrecies, apparent or real, which may be discovered ween my final report and the various post-mortem ounts.

I hope I may be allowed here to express my nowledgments to the Professors at the Royal Vetery College, to the Veterinary Department of the y Council, and also to the Professors at the ert Veterinary College* for the opportunities and stance which they have severally afforded me in prosecution of my inquiries; to the artists, Messrs. on and Burgess, for the exquisite drawings which have made in illustration of my report; and to srs. Sankey, Ward, and Rayner of St. Thomas's pital, who have acted ably as my assistants in the se of my investigations.

Condition of Skin.

cutaneous eruption (Plates I. and II.) is present large proportion of cases; so frequently indeed o form one of the most characteristic features of the disease. This eruption has a *primâ facie* resemblance, in the more hairy parts to the scabby stage of eczema impetiginodes, in the less hairy parts to the eruption of impetigo or of modified small-pox. I have never yet, however, discovered either a true vesicle or a true pustule, nor have I satisfied myself that true pus is ever secreted (excepting accidentally) in this disease by any part of the skin or of the glandular tissues connected therewith. The eruption appears to me to consist in congestion (inflammatory, doubtless,) of the capillary plexus of the true skin, and of those involutions of that plexus which are distributed upon the sebacious glands, with consequent desquamation and increased growth of epidermis, and superabundant formation and discharge of sebacious matter, and the development in variable proportions of nuclear pus-like corpuscles.

The udder is the part in which the eruption is probably most characteristic, and in which it can best be studied. Here, in cases of moderate severity, the eruption consists of a number of spots scattered irregularly over the surface, for the most part discretely, but here and there clustered two or three together. The individual spots are circular or nearly so in outline, and have a diameter varying perhaps between a quarter of an inch and a line or even half a line. But they often pass insensibly at their margins into the surrounding skin, so that their superficial extent is not always easy of accurate determination. Their elevation above the general surface varies, and varies in some measure with their diameter, but ranges mostly from one-eighth of an inch downwards. Their central, and usually by far their largest, part consists of a dirty yellowish or brownish crust. This is generally of nearly uniform character throughout, softish and greasy to the feel, and traversed commonly by one or more fine hairs. Its upper surface is rounded or irregular in form; its margin is mostly well-defined, more or less irregularly circular or polygonal, sometimes overhangs the surrounding integuments, sometimes merges as it were into them, and very often is overlapped by an irregularly scalloped border of the superficial layer of epidermis which the crust, in process of formation, appears to have undermined. The crust may generally be separated with ease from the subjacent tissues, but no distinct space or cavity is ever, so far as I know, found between them, and no accumulation of pus or other fluid. The surface exposed by its removal is that of the true skin, which is always deeply though superficially congested in the area corresponding to the superficial extent of the disease. I believe that this congestion occasionally results in extravasation of blood into the substance of the true skin, and occasionally leads to escape of blood in small quantities externally; but I have never recognized any actual destruction of surface by ulceration or any other process. In some cases the denuded surface of skin presents no appearances beyond such as have been described. But in many cases it can be distinctly seen, in process of removing the crust, that this is attached to the skin by fine whitish, or yellowish, or even bright yellow rootlets, the number of which varies with the superficial extent of the crust (Plate XXIII. A.). These, which are the much hypertrophied sheaths of the hairs, and measure

* I ought not to omit mentioning by name Mr. Duguid, urer on Physiology at the Albert College, who has given om time to time most important personal and other assis-

Dr. Bristowe. Report to Commissioners.

about an eighth of an inch in length, generally remain attached to the crust. Under such circumstances the denuded area will be seen perforated by one or more roundish holes, which are the dilated orifices by which the hairs, and the ducts of their associated sebacious glands, emerge. Occasionally (and this either represents a later stage of the disease, or is a peculiarity of certain cases) these orifices, while retaining their circular form and their rounded edges, become largely dilated, attaining a diameter of one-tenth, one-eighth, or even one-sixth of an inch. If a vertical section be made through the centre of these spots, it will be seen (as has been already pointed out) that the congestion of the true skin radiates as a rule little, if at all, beyond their limits, that it is generally quite superficial, but that it extends around and includes the involved groups of sebacious follicles; it will also be seen that these latter are hypertrophoid, and generally easy of enucleation (Plate XXII. c.). In the cases in which the common orifice of the hairs and ducts has become excessively enlarged, the mass imbedded in the substance of the skin is generally found enlarged in proportion; and this mass, surrounded by a margin of congestion, consists as in other cases of hypertrophied sebacious glands, but comprises also, I believe, a certain proportion of the connective tissue intervening between them, and of that which forms their common investment. It is in this situation alone that I have once or twice recognized what I believe to have been a small accumulation of pus.

Microscopic examination shows:—first, as regards the true skin, that its redness is generally due simply to the distension of capillaries with blood, and that there is never (so far, at least, as I have had the opportunity of observing) any development in its substance of abnormal morphological elements; second, as regards the epidermis of the diseased area, that this has become shed in various degrees, sometimes wholly, leaving the papillary surface completely bare, sometimes partially, the rete mucosum remaining still adherent; and as regards the epidermis immediately bounding this area (Plate XXIII. b.), that it is often distinctly undermined, that its edge (in its whole thickness) is irregular from partial separation of its constituent epidermic scales, and split up here and there to a greater or less extent in the horizontal direction. The microscope shows further, as regards the crust, that this consists, in by far the largest proportion, of sebacious matter; but that mixed up with it are fragments of epidermis, and here and there coherent masses of nuclear bodies somewhat resembling pus corpuscles. It shows also that the sebacious matter, which distends the glands connected with the diseased area, is of the same character as that which forms the greater part of the crust; that similar sebacious matter largely distends the sebacious ducts; and that these ducts, together with the dilated and elongated epidermic tube which forms their common sheath, are continuous with and lost in the substance of the crust. The pus-like corpuscles to which I have referred are generally irregular and somewhat refractive bodies, without any distinct cell-wall, and without any positive nucleus. The action of acetic acid is generally to dissolve their outer part more or less completely, and to leave in the place of each a small aggregation of molecules. In all these respects, as well as in their tendency to cohere, they differ markedly from true pus. I believe them to be derived chiefly, together with the sebacious matter, from the sebacious glands, or from their orifices; but I have no doubt that they are produced in some degree also by the surface of the true skin. I may mention, as favouring this view, that aggregations of them are generally to be met with in the vicinity of the mouths of the sebacious ducts, and that I have often observed them forming a constituent part of crusts which have been developed on a surface still covered by an adherent epidermic layer. I may here add also that the matter of the crusts often extends laterally into the crevices and fissures which exist in the surrounding epidermis.

On other parts of the skin, where (as on that of the udder) there are numerous sebacious glands, but where additionally hairs are abundantly developed, the morbid action appears to me to be less intense in degree, but to operate pretty uniformly over a comparatively extensive area. The nature of the morbid change seems to me, however, to be essentially identical with that which has been already described. The surface is covered continuously with a greasy crust which varies somewhat in thickness, and is often lumpy and irregular externally, giving at times the impression that it is the result of some impetiginous affection. It is perforated by the hairs, to which also small separated flakes of crust often adhere. On its removal the surface of the true skin becomes exposed either entirely bare or covered with a layer of epidermis, and it is seen that the crust is prolonged inwards upon the hairs into the hair-sheaths and sebacious follicles, exactly as in the case previously considered. Further, the surface of the skin is found more or less deeply congested, and the sebacious glands generally enlarged. Microscopic examination confirms the identity of process (Plate XXII. b.). The crusts consist of sebacious matter mixed with epidermic scales and groups of nuclear bodies; they lie sometimes on the surface of the true skin, but generally on an intervening layer of epidermis, and they are directly connected, both anatomically and by constitution, with the hair-sheaths and the contents of the sebacious ducts.

On certain other parts of the skin again, as on that covering the nipples, where neither sebacious glands nor hairs exist, the process of disease is necessarily somewhat different. In this situation, the surface of the true skin becomes reddened, sometimes in spots which may be very minute, sometimes general though still it may be irregularly; and over the site of congestion an excessive formation of epidermis takes place. The epidermis becomes thick and soft and friable, irregular and flaky on the surface, and tends according to circumstances, to separate at certain points, or as in chronic eczema or psoriasis, to become fissured. The fissures take chiefly the direction of the natural furrows, and occasionally even penetrate the surface of the true skin. In the crusts (if they may be so termed) which present the above characters, I have failed, as might be supposed, to detect sebacious matter; but I have detected, though in small proportions, pus-like corpuscles. They consist, in fact, chiefly of loosely coherent epidermic cells studded, it may be, with a small amount of granular matter.

The above varieties of eruption appear to me, as commenced by stating, modifications merely of one and the same morbid process—modifications determined to a great extent by the anatomical peculiarities of the various regions involved, and in some measure by the degree of intensity with which the skin affected manifests itself. Hence, while the first variety shows itself chiefly, as I believe, in those situations in which the sebacious glands are large, as upon the udder and especially around the bases of the nipples, and upon the perinæum; while the second variety occurs chiefly on the more hairy parts of the skin, as, for example, about the neck and back; and while the third variety is chiefly observed on places like the nipple void of sebacious glands; occasionally, in some situations, all varieties are more or less intermingled. The latter condition is by no means infrequent on the udder; the surface of which then assumes an irregularly scabby complex character, difficult to interpret without such a key as the foregoing description aims at supplying.

I may add here, that I have observed nothing special in reference to the congestion of the skin beyond what I have already described. All parts on which exudation occurs are more or less reddened, and wherever the disease is specially intense, there the redness is proportionately deep. Hence, on some parts of the skin the redness is more or less uniformly diffused, on other parts it presents a spotty or patchy arrangement. And sometimes where there are numerous

ous more or less discrete spots of disease, as on the dder, redness, though most intense in connexion with he spots themselves, extends over the whole of the pace intervening between them. I may add also that n some cases where there is no distinct eruption, the kin is seen to be slightly furfuracious, and perhaps little more rosy than in health.*

Condition of the Mouth, Fauces, Pharynx, Nose, and Eyes.

Mouth, fauces, and pharynx.—The mucous membrane of the oral and pharyngeal cavities shows with very rare exceptions well-marked indications of disease. These indications are not observed indifferently over all parts of the mucous surface, but tend to predominate in certain regions. Such are, the inside of the lips and gums, the papillæ situated within the angles of the mouth, the under surface of the tip of the tongue, the sides of this organ, and that part of its dorsum lying between the circumvallate papillæ in front and the epiglottis behind, the posterior part of the palate, and the pillars of the fauces. The anterior three-fourths of the dorsum of the tongue and the corresponding portion of the palate are much more rarely diseased, and always in a minor degree. The morbid conditions observed in the regions now under consideration have some resemblance to that which constitutes aphtha, and again to those which accompany diphtheria. I have never, however, recognized here the presence of any microscopic fungi, which by some observers are looked upon as an essential characteristic of true aphtha ; nor in my belief does the exudation in this disease ever assume those characters of a distinct false membrane which belong to the diphtheritic membrane.

The disease in the mouth, fauces, and pharynx, like that of the skin, consists, I believe, essentially in congestion of the mucous surface with increased formation and softening and tendency to separation of epithelium, and preternatural activity of function of the mucous glands. The excretion of mucus indeed is peculiarly abundant ; and it is worthy of remark that, in the case of the tongue and palate at least, the distribution of the morbid processes has a very close quantitative affinity with the distribution of the glands.

The appearances presented by the diseased mucous membrane of the cavities under consideration differ very much in different parts, though in dependence chiefly I believe upon their several peculiarities of structure and of anatomical arrangement. It will be convenient to describe the morbid appearances of these different parts separately.

(*a*) *Lips and gums.*—All parts of the mucous membrane of the lips and gums are liable to become affected, but the morbid processes are generally most marked, I believe, on those connected with the lower jaw. The disease here is certainly very aptly expressed by the term "aphthous." (Plate III.) It begins with the appearance of small round spots, in which the epithelium is opaque and yellow, a little thickened, and a little granular on the surface, and at the same time somewhat softened and easy to be detached from the basement membrane ; which in the corresponding area is more or less deeply congested. These spots in increase in size, others appear, and contiguous spots run together, forming irregularly sinuous patches of more or less considerable extent. But as this extension of the disease takes place the softened epithelium becomes detached, partly naturally, partly no doubt by violence, and the subjacent congested surface becomes more or less extensively exposed. Thus, in advanced cases, the mucous surface becomes studded with irregular islets of excoriation, surrounded for the most part by an irregular border of opaque softened epithelium, and beyond this by an imperfect network of the still healthy mucous membrane, which separates the patches of disease more or less completely from each other. Now and then little or no such excoriation takes place ; but the unhealthy epithelium accumulates and the surface assumes consequently a nearly uniform opaque yellowish granular condition. The morbid processes above described are very apt to occur on those portions of the gum which surround the necks of the teeth.

Exactly the same changes take place in connexion with the papillæ within the angles of the mouth. These become congested ; their epithelial covering becomes opaque and thickened and softened, and flakes of it become detached. This detachment is very irregular ; sometimes a cap of epithelium comes away from the apex of a papilla, sometimes a ring from the base, but more generally irregular fragments separate indifferently from any part of the surface.

(*b*) *Tongue.*—On the under surface of the tip of the tongue the disease generally appears as an irregularly crescentic or semicircular patch, the convexity of which corresponds to the anterior margin of the organ. The disease is generally most intense along this margin or at the lateral portions of it, and fades away insensibly behind. It consists simply of congestion of the surface, with an exuberant formation of epithelium, which, as on the lips, becomes opaque and yellowish and soft and occasionally detached. Patches of the same kind usually stud, more or less irregularly, the sides of the tongue in their whole length.

But the part of the tongue on which the disease is generally most intense is that limited somewhat roughly, in front by the most anterior of the circumvallate papillæ, and behind by the epiglottis. (Plate IV.) The congestion of surface is here often extremely vivid ; and the epithelium covering it is, as elsewhere, opaque, thickened, granular, and pulpy, and apt to separate. The processes occurring in this situation are always essentially identical, but the appearances which they produce vary a good deal. Thus in some cases little or no detachment of epithelium takes place, and the epithelium becomes consequently remarkably thick, (like that of an ordinary thickly-furred tongue,) and forms in some parts, and especially immediately in front of the epiglottis, a series of ridges, the direction and form of which are determined by the normal arrangement and movements of the surface. In other cases the accumulation of epithelium is comparatively small, and its detachment and the consequent formation of excoriations comparatively extensive. This detachment may occur anywhere, but the chief situations of it are two lines passing obliquely from behind, forwards and outwards, and corresponding, I imagine, to the posterior boundary of that portion of the dorsum of the tongue which during deglutition is pressed against the fauces and palate. The detachment here occurs in irregular spots, which tend to coalesce, and often by their coalescence form patches of considerable extent. The disease, such as has been described on the base of the tongue, extends thence on to the pillars of the fauces and on to the soft palate, and in fact also to the contiguous parts of the pharynx. In the latter situations, however, while the congestion is very often more intense than in the tongue, the change in the character of the epithelium is less marked.

The greater part of the dorsum of the tongue—all that in front of the circumvallate papillæ—is generally as nearly as possible healthy ; occasionally, however, traces of disease are discoverable. These consist of a small number of irregularly scattered spots (Plate IV.), in which the epithelium appears yellow and slightly elevated. The spots are generally round or roundish, and about one-eighth of an inch in diameter. They may, however, be larger. Here as elsewhere the affected patch of epithelium is softened, and its attachments are loosened, it can be readily scraped away, and occasionally has become spontaneously detached ; and here as elsewhere the subjacent surface is congested, the congestion corresponding almost accurately in extent to the space which the softened epithelium occupies.

(*c*) *Palate.*—The processes of disease as they occur in the palate are exceedingly well marked and in-

* For diagrams of skin eruption, see Plate XXII. A.

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teresting. (Plate V.) The palate is sometimes nearly healthy; sometimes the disease in it is limited to the posterior part; and in every case in which the more anterior parts are involved, the morbid processes increase in intensity from before backwards. The disease in the palate consists in the formation of small round spots, in which the epithelium becomes a little opaque and granular, and separates, leaving a round depressed congested surface. The spots gradually enlarge in area; neighbouring ones coalesce; and thus are produced irregular sinuous tracts of various and often considerable sizes. Sometimes the numbers of these patches are so great, and their intercommunications so free, that much of the surface which remains healthy survives in the form of isolated fragments. The shape of the patches of disease in the anterior half of the palate is a good deal influenced by the anatomical peculiarities of the part; and not infrequently the disease here appears to arise in connexion with the papilliform borders of the prominent ridges.

The destruction of tissue in the various regions, the morbid conditions of which have just been passed in review, rarely extends deeper than the epithelium, and beyond the production of an excoriation. Occasionally, however, sloughy ulcers form, and penetrate deeply into the tissues subjacent to the mucous membrane. I have seen one such ulcer during life on the dorsum of the tongue, and in one case after death two or three such ulcers on either side of the tongue near its root, and one immediately in front of the epiglottis.

The congestion of the mouth, fauces, and pharynx is generally very intense beneath the diseased patches of epithelium, and especially so in the situations in which excoriation has occurred. It is generally, too, much deeper at the base of the tongue, on the pillars of the fauces, and on the soft palate than elsewhere. The excoriated surfaces occasionally bleed; and sometimes, towards the back of the cavity particularly, spots of submucous extravasation may be seen. The congestion, however, excepting in connexion with the loose tissues of the soft palate and neighbouring parts, is almost always quite superficial. It rarely penetrates to the depth of half a line even at the base of the tongue. I have never recognized in the congested tissues, under the microscope, any morbid appearances other than those depending on the presence of blood.

Microscopic examination of the whitish granular exudation on the lips and gums, tip of the tongue, base of the tongue and fauces, shows that it consists partly of healthy epithelial scales, partly of epithelial scales which have become granular, and partly of masses of nuclear bodies like those observed in connexion with the cutaneous crusts. These latter have some resemblance to pus, but cohere into masses, and are scarcely affected by acetic acid like true pus-corpuscles; moreover, the fluid which surrounds them coagulates under the influence of acetic acid like that of mucus. The exudation appears therefore to consist essentially of epithelium, the component elements of which have become separated from one another (in consequence probably of the infiltration between them of some fluid effused from the subjacent surface) and of corpuscles, the formation of which is probably connected with this effusion.

In the opaque spots occurring now and then on the anterior part of the dorsum of the tongue, where the epithelium is thick, the same changes essentially are observed. The patches of opaque softened epithelium are found to consist chiefly of epithelial scales which have lost their mutual cohesion, and are sometimes more or less granular, and sometimes (compared with those of the healthy surface around) appear plump and yellowish and refractive, as if distended with some jelly-like material. Besides these may often be seen, as in the former case, masses of pus-like nuclear bodies, which are to be be found generally, I believe, somewhat deeply seated.

The minute examination of the roof of the mouth furnishes the most interesting results. Here a close inspection with the naked eye shows the presence of numerous minute orifices (the mouths of the mucous glands), from which often beads of transparent mucus stand out, looking at first sight like vesicles. Mixed up with these will mostly be seen round orifices of larger size, from which also mucus is exuding, but of which the floors look distinctly congested; and if a vertical section be made through them, it will be seen that the epithelium is excavated, and the subjacent mucous surface congested, in an area equalling or a little exceeding that of the excavation. Between these and the largest excoriations all gradations of size may be seen. Further careful inspection will generally show that the depth to which all the excoriations go is nearly uniform, that the excavated surfaces are, except at the edges perhaps, perfectly smooth and deeply congested, and that on these excoriated surfaces, in proportion to their extent, are many minute orifices, from which, as from the healthy surface, mucus exudes. Microscopical examination reveals that in the early formation of these spots there is actually an excavation of the epithelium, (Plate XXIII. c. and d.), sometimes limited to that portion of it superficial to the papillæ, sometimes involving the papillary portion as well, and displacing or even destroying the papillæ. It shows further that the epithelium of the affected part, or that immediately bounding the excavation, is, like that in the spots on the dorsum of the tongue, sometimes granular, generally yellowish and refractive, and generally too split up or tending to separate into its component scales. Sometimes there may be observed here masses of pus-like corpuscles like those observed in other parts; and occasionally I have met with (deeply seated) large roundish or irregular bodies, from which, under the influence of water, a delicate cell-wall rises, and which seem filled with irregular masses of oleo-albuminous matter. From this description of what may be observed in the palate, it seems pretty clear:—that the disease there, if not originating necessarily in the glands or rather in the course of their excretory ducts, is at all events remarkably influenced by these organs:. that the excoriations commence generally from them as a centre: and that probably the disintegration of the epithelium is largely promoted by the action of their secretion. From the circumstance previously referred to, that in other parts of the surface of the oral cavity besides the palate, the chief seats of disease are those generally in which the mucous follicles are most abundant, it is not improbable that in these parts also the presence of the glands aids in determining the presence of disease, and that the glands play an important part in its subsequent progress.

Nose and Eyes.—The whole of the lining membrane of the nasal cavities furnishes abundant secretion of mucus, and is generally nearly black with congestion. This is deepest, I believe, on the upper surface of the soft palate. The nostrils sometimes present aphthous spots. The conjunctivæ also are almost invariably congested, and there is some secretion from their surface; but I have not met with any further change in connection with the eyes.

Condition of Alimentary Canal.

Lower part of pharynx, and œsophagus.—Congestion almost invariably extends from the pharynx along the first two or three inches of the œsophagus. The congestion here varies considerably in degree in different cases, and occasionally exceeds the limits which have just been assigned to it. Now and then points more or less numerous, of submucous hæmorrhage exist with congestion. The mucous membrane of the rest of the tube is, so far as I have observed, invariably free from congestion, and healthily pale. The upper congested part of the region under consideration is generally studded, sometimes thickly, with minute granular spots and excoriations; and in a very small proportion of cases, similar morbid appearances extend throughout the whole remaining length of the tube. (Plate VI.) These seem to have precisely the same essential characters as the spots of disease in the mouth. They consist, in the first instance, of

hickening and softening, with opacity, of the pithelium, over a slightly congested surface; and n the second instance, of an excoriation resulting rom the detachment of the central portion of this pithelium. I have failed to detect, under the niscroscope, in these spots of disease, any evidence of ous. The only abnormal condition, indeed, which I ave observed is in the epithelium itself. This appears to become generally highly granular, and ccasionally, I believe, unusually refractive.

The spots which have just been considered vary rom almost invisible points up to a quarter of an nch in diameter. They may, however, be larger. The mallest are always circular, but as they increase in ize they become oval, and the largest are almost linear; o that the excavations in which they result present he appearance of shallow fissures. Their long iameter is always parallel with the axis of the esophagus, a peculiarity which probably depends on he direction of the mucous folds.

Occasionally the epithelial lining of the œsophagus found, or becomes during the post-mortem examinaion, entirely detached, in the form of a membrane, rom the other walls of the tube. This condition, owever, is merely an accidental post-mortem change.

Rumen, reticulum, and omasum.—Although the rst three stomachs differ very much from one nother in their internal mechanical arrangements, ney closely resemble one another in the papilary character of their lining membrane and in the ick cuticular character of their epithelial investment. hey closely resemble one another also, I believe, in ie nature of the morbid processes which they severally ndergo. These consist, first, in congestion; second, submucous exudation, and occasionally, I believe, xtravasation of blood; and third, in the formation of oughs, which tend after a while to separate from ie surrounding tissues. The epithelial lining in ese organs, as in the œsophagus, remains often firmly tached to the surface of the mucous membrane; ten, however, as a result chiefly of post-mortem ocesses, it admits of easy detachment as a more or st coherent membrane, or even separates in this rm spontaneously. It may be added that, contrary what we have observed in the preceding portions the alimentary canal, the epithelium here always lheres with abnormal firmness to the patches of sease, excepting (it may be) in quite their earliest age.

(*a.*) *Rumen.*—The contents of the rumen are nerally abundant, and as near as may be normal. his, from the early arrest of rumination which almost ways takes place, might be expected. The mucous embrane also of this stomach is in the majority of ses quite healthy, or at most presents in places a ffused faint rosy tinge, which, if not strictly normal, n yet scarcely be regarded as real evidence of ease.

In some cases, however, portions of the surface esent congestion in a marked degree—congestion anifesting a port-wine tint, and occurring in tches with a distinct and abrupt margin. These tches are of irregular shape and size, and running gether form congested tracts of (it may be) conderable extent. When these occur in that region the stomach in which the papillæ are small and the ithelium transparent, they may be easily recognized rough the epithelium; but when they exist in those uations in which the papillæ are large and the ithelium opaque with pigment, they are not readily servable until the epithelium has been removed. ose inspection, however, of such diseased tracts will en reveal, without any such preparation of them, e presence here and there of papillæ distinguishable m those around them by their peculiar plumpness d redness. In all these cases the congestion extends t slightly into the thickness of the parietes.

In a still smaller number of cases, associated nerally with a certain amount of the congestion ich has just been described, sloughing of the ucous membrane may be observed. This occurs in patches which vary very greatly in size, measuring sometimes not more than a quarter of inch in diameter, sometimes, it may be, eight or nine inches across; in patches which vary very much in shape, being often round or oval, often irregularly sinuous, and often altogether irregular; in patches which vary also in their aggregation, being sometimes scattered sparsely, sometimes collected into groups, and then it may even be more or less confluent.

The diseased patches, as they occur on the smoother and paler portions of the mucous membrane, present a dirty brownish, perhaps slightly greenish, coherent slough, which has perfectly well-defined margins, and is generally separated by a more or less complete line of ulceration from the surrounding mucous membrane. (Plate VII.) The edges of the latter, immediately bounding the slough, are generally tumid, sometimes also congested, but occasionally in a perfectly normal condition. A vertical section shows that the slough involves for the most part little beyond the mucous membrane itself, that the separation is less advanced beneath than at the edges, and that the tissues immediately subjacent to the slough present generally a slightly greenish tinge, and more or less evident traces of congestion. The patches which are met with in the more coarsely papillary parts of the stomach are generally easy to be recognized, even while their epithelium remains perfect:—by their colour, which is often paler than that of the healthy tissues, aud somewhat of an olive-brown tint; by the generally flabby condition of their papillæ, which makes them fall together, lose at first sight their individuality, and form collectively an unnaturally smooth depressed surface; and also by the presence, among these, chiefly at the edges, of a few scattered papillæ, which are plump, congested, and stand out with unusual prominence. (Plate VIII.) In those cases, in which there is slight adhesion only of the epithelium to the general surface of the mucous membrane, its removal renders the patches of sloughing remarkably prominent, inasmuch as those portions of it which invest them cling still to their surface, and by their depth of hue increase the contrast between the healthy and the diseased parts. The sloughs in this part of the stomach are generally larger than those in the smoother region of the organ; and, partly perhaps because its parietes are thicker, the morbid processes extend somewhat more deeply into them. In all other respects the changes which take place here are identical with those which have been already described. The sloughs tend to separate from the still healthy parts by a line of demarcation, which is always more distinct at the margins than it is on the deep aspect, and the sloughing area is further circumscribed to some extent by a slight degree of congestion.

In one case I have seen the sloughs in this stomach more or less completely detached; but it has not occurred to me to meet with the later process of cicatrization.

(*b.*) *Reticulum.*—In reference to this compartment of the stomach there is little to be said. Its contents, like those of the rumen, appear to be generally normal; and its mucous membrane is almost without exception quite healthy. In two or three cases I have seen in it distinct patches of congestion, more or less deep, more or less circumscribed, and evidentally abnormal. But I have never met with disease here passing beyond the stage of congestion.

(*c.*) *Omasum.*—The contents of the omasum are almost invariably preternaturally dry and caked; and as they are, at the same time, moulded accurately to the highly papillary surface of the folds of this stomach, it is probably due to the concurrence of these two conditions that the epithelial covering of the folds (when, as often occurs, its normal attachments are loosened) becomes so frequently in this disease removed with the food.

The folds of the omasum are sometimes entirely healthy; sometimes they present a little diffused redness; and very generally the larger vessels radiating from their attached border contain a good deal of

blood. None of these changes, however, seems necessarily an indication of disease. In the majority of cases, nevertheless, the presence of disease is manifest. This commences with congestion, passes on to gangrene, and, if the case be sufficiently protracted, proceeds to separation of slough and to cicatrization.

The congestion in the early stage is always more or less vivid and circumscribed. (Plate IX.) Sometimes it affects the papillæ alone over a definite space, the intervening surface remaining pale ; at other times the level surface alone is congested, the papillæ retaining their normal condition ; sometimes it involves one side only of a fold ; at other times occupies its entire thickness. More commonly, however, the congestion pervades more or less completely all the parts included within its area. The patches of congestion vary greatly in size and shape and number. Thus, sometimes they are so small as to include only a single papilla, sometimes two or three contiguous papillæ only, whereas at other times they occupy an area measuring half an inch, an inch, or even more than an inch in diameter ; again, sometimes they are round or oval, sometimes very irregular in shape; further, sometimes only one or two such patches are present in a fold, sometimes a fold is thickly studded with them. When they are numerous, they may generally be distinctly seen to occur specially, if not solely, along the ramifications of the larger vessels ; and they produce a strongly mottled condition of the fold, the patches of congestion being separated from one another by a network of healthy tissue. In this stage of the disease there is no abnormal adhesion of epithelium to the surface ; the congested membrane retains, as nearly as may be, its natural thickness and transparency ; the redness is found to be due to simple distension of the capillary (Plate XXIV. A.) and other small vessels with blood (they are, in fact, as distinctly seen under the microscope as if injected artificially with vermilion), and it rapidly disappears with exposure to the air.

The formation of sloughs undoubtedly supervenes on the stage of congestion ; and equally undoubtedly the situations in which the sloughs appear are some of those which had previously been the site of congestion alone. (Plate X.) The patches in which sloughing is taking place may be as small as the smallest of those in which congestion is observed ; that is to say, the process of sloughing may involve two or three contiguous papillæ, or even one papilla only ; very often too they vary in diameter from half an inch to an inch, but they sometimes attain an area of three or four square inches or more, an area far larger than any which I have yet seen equalled by simple congestion. The larger patches are generally very irregular in shape ; but those of medium size are mostly round or roundish, and when they involve the free edge form the segment of an ellipse or circle. During the time of the formation of the slough, the affected patch becomes thickened and opaque, and the epithelium, which assumes over it a dirty greyish hue, becomes attached to it with abnormal firmness. This covering of epithelium very much conceals the subjacent changes ; yet even through this covering, (but much better of course if it be detached,) deep congestion, with more or less brownish discolouration of the papillæ and other parts of the affected patch, may be recognized. This congestion, deep indeed, yet somewhat muddy looking, sometimes occupies the entire surface ; but more commonly an irregular margin of such congestion surrounds a central area in which the general hue is an olive-brown. The separation, however, between the two conditions is rarely complete ; for generally, olive-brown papillæ will be seen scattered upon the congested margin, and isolated papillæ, intensely congested, may often be observed in the central disc.

After awhile the death of the part becomes complete, and a line of demarcation rapidly forms around it. The slough separates from the surrounding tissues, and ultimately falls into the cavity of the omasum. If the slough have occurred in the central part of a fold it leaves a perforation, if at the free edge a corresponding indentation. The amount and number of sloughs which thus become detached from a single fold are sometimes very great, and the degree of irregularity of edge and surface thus produced is often very remarkable. The portion of the fold which forms a margin to the separating or separated slough seems to cicatrize coincidently almost with the detachment of the slough ; but it remains for a while a little congested, a little tumid, and smoother than natural. This cicatrization takes place even while the disease is hastening to a fatal issue.* (Plate XI.)

I have pointed out that the above affections of the omasum occur in single folds with different degrees of severity. I may add that when present in any case they by no means necessarily affect all the folds, far less affect them all equally. Sometimes the greater number of the folds are found diseased, sometimes the disease is limited to two or three of them.

There is little difference on microscopic examination between the appearances observed in the sloughs of the omasum and those observed in the sloughs of the rumen. I believe that in both cases, but more especially in the former, actual extravasation of blood not unfrequently takes place into the tissues ; but the opacity of the parts renders the determination of this point difficult. The point on which I feel most certain, with regard to the tissues subjacent to the basement membrane, is that they are obscured by an abundance of granular matter, sometimes more or less aggregated into masses, which is absent from the healthy parts ; and that, except for the presence of this, the tissues appear as nearly as possible healthy. In one of two cases in which I examined the epithelia covering of the sloughs in the rumen, I found it to present an abundant growth of a lowly form of vegetable fungus ; and in all the cases in which I examined the corresponding part in the diseased omasum, the same vegetable growth was discovered. (Plate XXIV. B.) I may add, that I never detected this but on the patches which were, or were tending to become, sloughy, although I looked for it carefully on other and even adjoining parts of the mucous surface ; and that it is not the result of post-mortem changes, for it does not increase with the length of time that the parts are kept after death. I have found it indeed in great abundance, an hour or two after death, on the diseased omasum of a cow slaughtered at the Metropolitan Cattle Market. The fungus consists of transparent colourless filaments, which throw off branches and buds in all directions. I have not seen any of its sporules. The diameter of its filaments varies, but seems to me to be about equal to that of the filaments of the yeast fungus. The appearance of this growth is of course an accident only of the disease, but it is an accident of such constant occurrence as to be on that account of interest. It development here is due no doubt to the facts that the sloughing surface affords an appropriate soil, and the stagnation of the contents of the stomach an appropriate opportunity, for the germination of certain sporules diffused through the food, which under other circumstances would have been hurried on or destroyed by the digestive process, and have proved (in the stomachs at least) unproductive.

I have an impression that the adhesion of the epithelium to the surface of the sloughs may be in part if not wholly, due to the growth of this fungus ; for I should state that although I have described the fungus as originating primarily in connexion with the epithelium, I believe that it penetrates this, and thus after awhile involves the subjacent tissues.

The epithelial scales in connexion with the sloughing regions appear to me, compared with those of the healthy parts, opaque and granular, and in some instances distended with some refractive exudation.

* The folds of the omasum occasionally present circular perforations from a line in diameter up to an inch or two, which have evidently no connexion with the disease of which the animal has died. These are either congenital or the result of former disease or accident. Their presence tends to show that perforation of the folds of the omasum is not peculiar to the Cattle Plague.

Abomasum.—The contents of the abomasum are sometimes normal or nearly so, but generally they are more fluid than natural, and rarely they comprise little blood.

This stomach generally presents important traces of disease, but by no means necessarily; and sometimes it appears to be perfectly healthy. The morbid conditions which are met with here consist in congestion, extravasation of blood and sloughing, and in ulceration or excoriation produced by the separation or disintegration of the sloughs.

The congestion varies in degree and in extent. Sometimes the redness is remarkably vivid, sometimes it is so slight as to make it doubtful whether it can fairly be regarded as an abnormal condition, and it ranges in different cases between these extremes. Sometimes again the congestion is universal, sometimes it is most pronounced at the pyloric extremity, sometimes in the situation of the folds. Further, the congestion is sometimes patchy, sometimes more or less uniform in its character. Associated with this congestion will often be found deep red points, for the most part circular, and varying from a line in diameter downwards, which look like petechiæ or fleabites (Plate XII.). These may occur on any part of the surface, and indeed over the whole surface, but are generally most abundant towards the pyloric extremity of the stomach, and upon and between the mucous folds. Sometimes very few of these spots are present, at other times they are extremely numerous; and then they may either be arranged discretely, or may form groups which sometimes run together into patches. In some cases small clots, the result of hemorrhage, hang from groups of these points into the cavity of the stomach. Microscopic examination shows that that condition which I have ascribed to congestion is simply due to overloading of the minute vessels with blood; and that that condition which I have likened to petechiæ, though in part often due to the same cause, is essentially the result of rupture of these vessels, and of extravasation of their contents into the intertubular tissue. Hæmorrhage into the cavity is of course, a further stage or phase of the same process.

Sloughs and excoriations are by no means uncommon in the abomasum, and as a rule they seem to be found chiefly in that region of it which lies between the folds of mucous membrane and the pylorus; occasionally, however, they are met with upon and between the folds themselves. The sloughs and excoriations may, of course, both be absent, or there may not be more than one or two sloughs, or one or two excoriations, or one or two of both. Sometimes they are exceedingly numerous.

The excoriations are irregularly round or polygonal depressions in the surface of the mucous membrane, varying from about one-sixth of an inch to half an inch in diameter (Plate XIV. B.). Their surface may be smooth or a little granular, sometimes a little paler, sometimes a little redder than natural. Their margins are formed of mucous membrane, which is often healthy, with the exception that it manifests an indistinctly radiating plicated arrangement, and is occasionally a little tumid and granular and congested. A vertical section shows that their floor consists generally of the submucous tissue; and the microscope demonstrates that the congestion which they occasionally exhibit is due simply to distension of the vessels with blood.

The sloughs vary in size, like the excoriations, but within wider limits, ranging between a quarter of an inch and an inch or even more in diameter. (Plate XIII.) The smaller sloughs are mostly round or oval, the larger irregular in shape, and formed apparently by the coalescence of two or three smaller ones. The slough is generally of a dark yellowish brown or reddish brown hue, smooth upon the surface, sometimes soft and pulpy, sometimes condensed and tolerably tough. Its margin is mostly well defined, and the mucous membrane around it generally normal as to colour and condition; except that it seems often to have become partially detached from the slough, and then by its elasticity to have retreated from it superficially, leaving an irregular but rather broad interval between them, consisting of the still adherent but stretched submucous tissue. Sometimes the slough is so loosely attached, as to admit of ready removal; sometimes it has already separated in part; and this separation may have taken place circumferentially, or may even have commenced at the centre, leaving a ring only of slough still adherent. The slough is almost always very superficial, involving scarcely the whole thickness of the mucous membrane. Occasionally, however, the sloughing process extends more deeply, and implicates the submucous tissue, and even more or less of the muscular parietes.

A careful examination of the superficial sloughing ulcers in their various stages cannot fail to convince any one that the appearances which I have termed excoriations are rather to be looked upon as cicatrices, and are the result of the formation and separation of sloughs. A vertical section through the sloughs which I have described will show, as I have pointed out, that they mostly involve the mucous membrane alone; but it will show also that they are generally of uniform tint throughout, and that their thickness is rarely more than one-third or at most one-half of that of the healthy mucous membrane around (Plate XXIV. C. 2.). A microscopical investigation of the sloughs shows further, that in many cases the follicles of the part have in great measure disappeared—have shed their contents probably and become shrivelled—and that their site is occupied by a fibrillated tissue studded thickly with black pigmentary matter, which is partly aggregated into masses, partly more evenly diffused; it shows in some cases that the tubes, though visible, are really empty, or nearly so, of epithelium, and that the intertubular tissue is black with diffused pigment (Plate XXIV. C. 1.); and it shows again in some cases groups of irregular cylinders which seem filled with a refractive sepia-tinted material, broken transversely at intervals, or broken up into angular fragments, of various sizes (Plate XXV. A.). These cylinders evidently are the stomach follicles reduced in diameter, and filled with some exudation, which has either displaced, or infiltrated and concealed, their epithelial lining. The several appearances which have just been described may be met with associated in the same slough. There can be little doubt, I think, that they are all due in the first instance to extravasation of blood, and in the second place to the changes which that extravasated blood itself undergoes, and to the changes which its presence induces in the tissues amongst and into which it is extravasated; that in fact the congestion, the submucous hæmorrhage, the sloughing, and the cicatrization are in successive dependence on one another, and that the various morbid processes, and their relation to one another, are (allowing for difference of structure) the same in the abomasum as they are in the omasum and in the rumen.

I may add here two additional facts in reference to the sloughs. One is, that sloughs occasionally form to or near the free edges of the mucous folds (Plate XIV. A.); that in this case many are apt to be grouped together; that they are mostly narrow and elongated in a direction parallel with the edge; that they commence simply as reddish-black discolourations; that they proceed to ulceration; and that their microscopical characters are identical with those of sloughs in other parts of the stomach (Plate XXV. B.). The other is that in one case, and one case alone, I discovered the same kind of fungus growing on the sloughs of the abomasum that I have constantly found on those of the omasum.

Intestines.—The contents of the bowels vary very considerably. Occasionally, if the animal dies or is slaughtered early in the disease, the contents—especially those of the large intestine—are very nearly normal. But generally they are unusually fluid. Sometimes they consist of little else than mucus, and are sometimes intermixed with blood. No doubt

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they are more offensive than the normal intestinal contents are; but nevertheless it does not appear to me that they possess anything like that degree of fœtor which has been generally ascribed to them.

The morbid processes observable in connexion with the walls of the intestines are essentially identical with those occurring in the higher portions of the alimentary canal; they consist in congestion and extravasation of blood, but rarely in the later stages of sloughing and ulceration.

The congestion varies very much in extent and degree; sometimes it affects simultaneously nearly all parts of the intestinal canal; sometimes it forms one or more tracts of considerable extent; sometimes it occurs in patches, and the situation and direction of these are determined often by the course of the prominent folds of mucous membrane. The parts most commonly thus affected are the small intestine or some part of it, the cœcum and ascending colon, and the lower part of the rectum; but any of these parts may, even in severe cases, be free from congestion, and sometimes they are all equally pale and healthy. In any part of the intestinal tract, but especially in those parts most liable to congestion, submucous hæmorrhage may occur in the form of petechiæ and of ecchymoses, and blood may be poured out even into the intestinal canal.

As regards the small intestine the appearances vary very remarkably; sometimes the whole mucous membrane, from the pylorus to the ileo-cœcal valve, is uniformly and intensely congested, and reduced to a viscid pulp, and blood may or may not have been effused therefrom into the cavity; sometimes such congestion is limited to the upper part of the intestine, sometimes to the lower part; and indeed, so far as I have been able to observe, all parts of the small intestine are equally liable to undergo this change; sometimes, again, the congestion occurs in small spots and patches, and these may be abundant and aggregated, or few and sparse. Submucous hæmorrhage occurs in various parts of the small intestine, but I have seen it most frequently and most remarkably in the duodenum (Plate XV.)

The cœcum and ascending colon are mostly more or less deeply congested. The congestion in this situation assumes very often a definite arrangement in accordance with the direction of the prominent folds of mucous membrane; it then takes the form of a number of broad more or less interrupted lines, running for the most part in the direction of the axis of the bowel. But the congestion, especially when it is intense, is by no means thus limited. It often occurs in irregular patches of various sizes, which run more or less together; and these are sometimes intermixed with a greater or less number of minute intensely coloured points of submucous hæmorrhage (Plate XXVI. a.), to groups of which I have occasionally seen, as in the abomasum, small, easy to be detached clots adherent and hanging into the cavity of the bowel. On the other hand the congestion here is not infrequently limited to certain small areas. Thus, now and then, it is discovered at the extreme point of the cœcum only; now and then it occurs only at the opposite extremity of this pouch; now and then it is limited to the cœcum, now and then to the ascending colon. The margins of the ileo-cœcal orifice are nearly always deeply congested.

The remainder of the colon and the commencement of the rectum are more often free from congestion than any other portion of the large intestine. Nevertheless, these parts not infrequently present scattered patches of congestion, and occasionally are congested in their whole length, the congestion forming a more or less perfect series of broad parallel longitudinal bands. The last five or six inches of the rectum (Plate XVI.) are almost always deeply injected, more deeply and uniformly injected as a rule, indeed, than any other part of the large intestine. The congestion generally commences from above in the longitudinal bands just described, but it widens out in its downward course, and in the part under description becomes general, though still deepest on the most prominent parts, and deepest probably of all immediately within the anus. In this situation submucous hæmorrhage and hæmorrhage into the bowel not infrequently occur.

The anal orifice itself is not generally much congested. Its cuticular covering is often healthy, but now and then somewhat aphthous. I have once seen prolapsus of the rectum; and, in connexion with this fact, I may mention that once in a goat I found invagination of the last two or three inches of the cœcum.

I have stated that sloughing and ulceration rarely occur in this disease in the intestinal canal. Such is my experience hitherto; but I should not be at all surprised to learn that these processes are more common here than I have been led to suppose them. I have once or twice seen shallow ulcers, much like those of the abomasum itself, in the duodenum immediately below the pylorus; and twice, linear sloughy ulcers, an inch or two long, at the lower part of the rectum. And I may add that, in two goats which I have examined (dead, I believe, of the cattle plague), there have been ulcers with adherent sloughs in the cœcum and ascending colon.

I have never detected any important morbid change referrible to this disease, in Peyer's patches. No doubt they partake in some measure in the congestion which pervades at times more or less extensive tracts of the general mucous membrane. On one occasion, too, I found many of them (thus involved) slightly excoriated, and covered on the surface with a thin whitish adherent exudation, which was evidently a product of the glandular follicles of the part.* No doubt, again, they occasionally show traces of old disease, or of unusual conditions, which may be mistaken for disease; they may contain tubercles, they are not infrequently honeycombed, and now and then some of their component glandules are enlarged. But Peyer's patches, as is well known, are prone to many forms of disease; and that, in a certain proportion of cases examined, these patches shall be found affected, independently of the disease which causes death, is to be expected. Peyer's patches again, enjoy no special immunity from the process of disease; and if in any malady there be a distinct tendency to affection of the general mucous membrane of the bowels, it would certainly seem unlikely that these patches should escape. I have found no more unhealthiness of Peyer's patches than can be accounted for on these two considerations, and have certainly detected no changes at all resembling those which characterize typhoid or enteric fever of the human being.

Condition of the Viscera connected with the Alimentary Canal.

Salivary glands.—I have not observed anything in connexion with these glands worthy of note.

Liver.—The liver, again, never—so far as I have been able to observe—presents any important pathological change; certainly it presents no constant change. I do not, of course, here refer to merely accidentally associated conditions of disease, such as cirrhosis, thickening of the bile-ducts, or the presence of hydatids, conditions which are not uncommon in cattle, and which I have met with on several occasions. The consistence and colour of the organ generally differ but little from what they are observed to be in the state of health. The gall-bladder is always distended with bile, which varies somewhat in character, is perhaps generally thin and watery, but not to the naked eye unhealthy.

Pancreas.—The pancreas evinces, I believe, no traces of disease.

Spleen.—This organ, as a rule, is neither enlarged nor materially softened. Now and then, perhaps,

* The exudation consisted chiefly of nuclei and round cell-like bodies.

somewhat more pulpy than in health; but this ıange is, I believe, more often due to post-mortem ecomposition than to the direct influence of disease.

Condition of Respiratory Organs.

The organs of respiration are almost without exception gravely affected. But here, as in the chylopoietic system, the morbid processes seem to affect primarily and most importantly the mucous membrane and the structures subjacent to it. The lung-tissue can scarcely be said to be implicated, except secondarily and by a kind of accident, as it were.

Air-passages.—The morbid conditions met with in the air-passages are chiefly, as in the alimentary canal, congestion and submucous hæmorrhage. These involve sometimes the larynx, sometimes the trachea, sometimes the bronchial canals, sometimes the whole system of tubes at once; and they are attended with increased exudation of fluid from the mucous glands, which sometimes adheres to the surface, forming what now and then might almost be termed a false membrane), and often with more or less hæmorrhage to the tubes themselves. The congestion is generally diffused and more or less uniform; the submucous hæmorrhage, always in the form of spots, which are apt to be clustered, and to be determined in shape and arrangement by the direction of the natural furrows and markings of the mucous membrane.

(*a.*) *Larynx.*—The larynx is generally congested in its whole extent, the congestion being least marked in those situations in which the arytenoid cartilages are most superficial, and most marked as a rule in the spaces between the arytenoid cartilages and the epiglottis, in the angle at which the vocal cords meet in front, and in the parts which lie, posteriorly and laterally, below the arytenoid cartilages. The congestion varies in degree, sometimes amounting to a rosy blush only, sometimes inducing almost complete blackness of the mucous membrane. With the congestion there is generally more or less œdema and swelling of the submucous tissue, especially of that connected with the epiglottis and the aryteno-epiglottidean folds. Generally, too, associated with these conditions (especially when the congestion is great) there is more or less submucous hæmorrhage. This occurs in roundish spots, varying from a line or more in diameter downwards, often slightly raised above the general surface, generally clustered, and for the most part occupying the sites which I have pointed out as those of deepest congestion (Plate XVII.).

The mucous surface is often partially covered with a slightly adherent layer, which is sometimes a mere film, sometimes presents considerable thickness, but has always seemed to me to have rather the character of inspissated mucus than of true false membrane. It consists microscopically of corpuscles somewhat resembling those of pus (mucous corpuscles probably), of epithelium more or less granular, and of granular matter; and its removal leaves the subjacent surface whole. The exudation here spoken of is always most abundant below the vocal cords and especially below the arytenoid cartilages; but it occurs also above and in front of these structures, and sometimes upon the vocal cords themselves. Sometimes, entangled to some extent with this mucus, small clots of blood may be seen, loosely adherent to the congested mucous membrane. Once or twice I have met with a rusty-coloured clot lodged in the rima glottidis. The vocal cords, as I have stated, are sometimes covered, like the rest of the laryngeal surface, with a layer of exudation. But I imagine that what might generally be taken for this, in this particular situation, is a granular condition of the surface, the result in great measure of excoriation; it consists, indeed in part, of those elements which I have described as constituting the more distinct form of exudation, but it contains also fragments of elastic tissue, and its removal by scraping reveals the denuded structures forming the vocal cords. This condition always affects the exactly corresponding parts of both vocal cords—those parts of them which are naturally in closest apposition. I believe, indeed, that this apposition of two already inflamed surfaces, attended, as it doubtless must be, with a certain amount of rubbing, furnishes the true explanation of the phenomenon. Occasionally this condition passes on to gangrene. Once I have seen the early stage of formation of sloughs on both vocal cords in exactly corresponding situations; and once I have seen fully formed sloughs similarly placed, which had involved deep-seated tissues (Plate XVIII.). In the case last referred to, there was also a fully formed slough in the angle formed behind by the approximation of the arytenoid cartilages, a slough involving also opposite coincident areas.

In many cases where the congestion of the larynx is intense, the intrinsic muscles of the larynx, or some of them, or parts of them, are black with sanguineous infiltration.

(*b.*) *Trachea.*—The trachea is generally more or less congested. When congestion alone is present, the hue may vary through different shades of red, and is generally of a somewhat uniform character. Sometimes, however, it presents spots and streaks in which the redness is of comparative intensity. Almost always when congestion is present there is also present a greater or less amount of submucous hæmorrhage (Plate XVII.). This occurs always in the form of red-black spots, over which generally the mucous surface seems a little elevated. The more minute of these are more or less circular; the larger form narrow streaks, which vary generally from about a quarter of an inch in length downwards, and always take the direction of the longitudinal lines which mark the surface of the mucous membrane. Sometimes very few of these spots are visible, and all occur within a very limited space; sometimes they are excessively numerous, and form thick-set groups, which run together, and render the whole surface of the mucous membrane almost black. All these changes of congestion and sub-mucous hæmorrhage may be general, or may be limited to certain parts. Sometimes they are most intense in the upper part of the tube, sometimes in the lower, sometimes in the front, sometimes behind. The regions most commonly thus affected, however, are, I believe the upper part of the trachea beginning from the larynx, the region of the trachealis muscle behind, and then quite the lowest extremity of the tube. But no part of the trachea, I repeat, necessarily escapes.

The mucous surface of the trachea presents sometimes only a normal degree of moisture; sometimes it is covered with exudation which is more or less mucopurulent, and this towards the upper part seems to condense occasionally into a kind of membrane, continuous it may be with that occupying the lower part of the larynx. Here, too, as in the larynx, small clots of blood are found loosely attached to the surface.

Not unfrequently, when the sub-mucous extravasation of blood is considerable, the trachealis muscle (like the muscles of the larynx) is black from infiltration with blood. Sometimes this condition exists only partially, but sometimes it prevails throughout the whole length and breadth of the muscle.

(*c.*) *Bronchial tubes.*—The bronchial tubes are liable to present any or all of those morbid changes which have been described in connexion with the trachea, viz., congestion, sub-mucous extravasation of blood, hæmorrhage into the tubes, and effusion of more or less unhealthy mucus; and to present them in equal variety of intensity and of distribution (Plate XIX.). Sometimes the bronchi are chiefly affected, sometimes the smaller tubes. And sometimes those of one lung are much more diseased than those of its fellow. I believe this latter difference to depend a good deal on the position of the animal previous to death; that hypostatic congestion during life increases here the intensity of morbid processes. I may add, that perhaps the most constant site of sub-mucous hæmorrhage in the tubes is some part of the margins of the orifices by which they communicate with one another.

The contents of the trachea and other air passages

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vary very much. In addition to the materials which have been described as adhering to the surface of the tubes, they sometimes contain a large quantity of frothy fluid, exceedingly like the froth that forms on the top of bottled stout; sometimes a quantity of muco-purulent fluid; and sometimes, together with these, coagula of blood; occasionally the coagula are considerable, and moulded to the cavities in which they are found; and occasionally their surface has undergone some change of colour.

Microscopical examination shows that the mucus in the air passages presents the ordinary characteristics of mucus; and it shows that the redness of the mucous membrane is due, as the naked-eye appearances indicate, partly to congestion, partly to patches of submucous hæmorrhage (Plate XXVI. B.). Beyond evidence of extravasation of blood, I have detected nothing abnormal in the condition of the laryngeal muscles and of the trachealis.

Lungs.—The lungs themselves, it appears to me, are, with one important exception, generally in all essential points healthy; or at most present only such trivial deviations from health as are of common occurrence in diseases where respiration is impeded by mechanical causes, or is imperfect in consequence of feeble and inefficient performance of the act. They are generally fairly crepitant; generally, too, somewhat congested, especially the lung of the side on which the animal has lain. They not unfrequently present patches of pulmonary collapse; sometimes patches, more or less extensive, of carnification. Once or twice I believe I have met with a little pulmonary apoplexy. True pneumonia is rare, and evidently an unusual complication; I have seen it in one case only.

The exceptional lesion to which I have above referred is interlobular emphysema (Plate XX.). This, in some degree, is found in nearly every case of cattle plague. It does not appear to me to occur specially at any particular part of the lungs. Sometimes it is small in quantity, and separates a few lobules here and there only, and might be overlooked were it not specially sought for. More frequently it is scattered pretty abundantly throughout both organs. And occasionally it is so extensive that a coarse network of it divides the whole tissue of the lungs into a series of lobules; and the air passes even from the interlobular spaces into the subpleural tissue, forming on the surface of the lungs a series of blebs or bullæ. Whenever the emphysema is at all abundant, those tracts of the interlobular tissue which radiate from the root of the lung become widely distended with air, and their distension will generally be found to increase as they approach the root.

What is the cause of this emphysema? Pulmonary emphysema in the human being has, as we know, almost always a mechanical origin; that is to say (without going into minutiæ which may admit of dispute) it is dependent, not on disease of the tissues of the lungs, but on obstructive diseases of the air passages—diseases attended with violent and more or less ineffective performance of the respiratory acts, and of the acts of coughing. These conditions are present in the case of the cattle plague in a marked degree; the lung tissues themselves are healthy, but the air passages, or some parts of them, are almost invariably advanced in disease—are rarely, perhaps never, sound. Moreover, it is known from observation during life, that animals with this disease do suffer in a high degree from difficult respiration and from cough. There can be little doubt, therefore, that the emphysema in this case also is mechanical, and a consequence of pre-existing morbid conditions of the air passages.

That the emphysema should consist, in the human being of simple rupture and dilatation of the air cells, and in the cow of extravasation of air into the interlobular cellular tissue, may appear at first sight discordant with this explanation. A further objection to it might perhaps be raised in the fact that emphysema in the human being—at least marked emphysema—is the result generally of a chronic process, while the emphysema in the cow arises in the course of a specially acute disease. These difficulties, however, lie on the surface only. The initial pulmonary lesion—the essence of the disease—in both cases is the same, and consists in the distension and rupture of air cells. In the human being, at least in the human adult, there is either no interlobular cellular tissue in the lung, or a trace of it only, and hence the ruptured air cells can only communicate with one another. Interlobular emphysema, therefore, is impossible. The cow, on the other hand, is remarkable for the abundance of its interlobular cellular tissue, and hence the ruptured air cells, although they may communicate with one another, are at least as liable to communicate with that interlobular tissue. But simple communication between neighbouring air cells will scarcely, except it be very extensive, produce any marked change in the appearance of a lung; hence, although the foundations of human emphysema are laid doubtless in attacks of acute disease, the emphysema rarely becomes prominent until it has been developed under the influence of protracted states of disease, or of a series of successive attacks. Rupture of air cells, however, into the interlobular cellular tissue (the interspaces of which are freely continuous in all directions) admits at once of the extravasation of air into this tissue; while every act of respiration increases the amount extravasated, and diffuses it. Thus interlobular emphysema manifests itself, and may become extensive, at quite the earliest stage of rupture of the pulmonary vesicles. I may add here that in the lungs of children (in which there is a little interlobular tissue) traces of interlobular emphysema may occasionally be detected after death from hooping-cough. I may also add that the anatomical peculiarities of the cow's lung, to which I have attributed the peculiar characters of its emphysema, lead to similar peculiarities in the morbid processes of human pneumonia. One of the striking features in bovine pneumonia, is the distension of the interlobular spaces with lymph, just as in emphysema they are distended with air.

Condition of Circulatory System.

Heart.—The muscular tissue of the heart is sometimes softer than natural, at other times of the consistence of health, and, indeed, unless decomposition has taken place, has the general aspect of that of a healthy organ. Sometimes there are a few petechial spots scattered about the external surface of the heart, more particularly at its base; and now and then ecchymoses are met with in the same situation. The most common and the most characteristic feature of disease, however, is the presence of effusions of blood beneath the lining membrane of the left ventricle (Plate XX.). These are generally nearly black in colour, of irregular shape and size—often of considerable size—and may be scattered over nearly every part of the surface; but they are most constant and generally largest about the apices of the musculi papillares. Sometimes a few only of these are present, sometimes they are almost innumerable, rarely they are absent. I have never met with them in connexion with any other of the heart's cavities. The effused blood is usually limited to the space between the endocardial membrane and the muscular tissue, but infiltrates the latter to some little depth, separating the muscular fibres from one another. The muscular tissue of the parts involved in the extravasations is, according to my observations, as healthy as that of other parts. That is, the muscular fibres generally are, I think, not granular, and less distinctly striped transversely than natural.

The contents of the heart's cavities vary. Sometimes the ventricles are empty, sometimes they contain a little fluid blood, sometimes coloured clots, sometimes a mixture of fluid and coagulated blood. The auricles are generally more distended. I have never yet seen a fibrinous coagulum in the heart.

Vessels.—I have nothing special to observe

gard to the vessels of the body, or their contents. here is no reason to suppose that the vessels are emselves in any way materially affected; and their ntents, like those of the heart, are sometimes fluid, metimes more or less coagulated.

Blood.—Comparing the condition of the blood of ws dead of cattle plague with that of cows killed in alth, there can be no doubt, I think, that that of the mer, as a rule, coagulates less quickly than that of latter, and that it is somewhat darker coloured. t whether this increased depth of colour is in any gree due to the special influence of the disease of ich they have died may, I think, be questioned; smuch as blood naturally assumes a dark colour in imals in which (as in these) due aëration has been vented; and inasmuch as the dark blood of cattle gue rapidly becomes bright and arterial on exposure air. I have detected nothing abnormal in its consti- ion under the microscope.

Lymphatics.—Beyond the fact that the bronchial nds are sometimes distinctly enlarged and con- sted, and that similar changes, in a minor degree, sometimes observed in the glands of the mesentery, have no information to give with regard to the aphatic system.

Condition of Genito-Urinary Organs.

Kidneys.—The kidneys present, for the most part, a fectly healthy aspect. They are now and then haps somewhat softer and somewhat more congested an natural. I have not examined them very care- ly microscopically, but my impression is that their uctures are generally normal; as normal at least as se of the human kidney in typhus, in diphtheria, d in such-like diseases.

Supra-renal Capsules healthy.

Bladder.—This is sometimes empty, but more monly contains a certain amount of pale healthy- king urine, and is sometimes distended with it. lining membrane is often in a perfectly normal dition; but is sometimes more or less congested; l occasionally presents spots of sub-mucous hæ- rrhage.

Urethra.—The urethral canal presents at times ts and patches of congestion and sub-mucous morrhage. I have specially observed these con- ions forming a ring a little within the external atus of the female urethra.

Uterus.—The uterus is sometimes a little congested, h within and without; and congestion is specially to be well-marked in the neck, where also there y be a little sub-mucous hæmorrhage. Generally, wever, the organ may be said to be not unhealthy. two or three occasions I have found it containing ætus. It has seemed to me then even, that there s no special degree of congestion, even in the yledons. The fœtuses have always been soft and somewhat decomposed, and free from any ication of the disease which had proved fatal to parent. My impression is that the fœtuses have d early in the course of the mother's illness, and e thus escaped taking it.

Ovaries.—These organs are generally healthy.

Vagina.—The upper part of this tube is now and n a little congested, but is mostly pale and healthy. e chief congestion occurs (and it is very common e) between the contracted portion of the vagina, in neighbourhood of the external urinary meatus, and vulva. The congestion in this situation is some- es very deep, and is often associated with points ub-mucous hæmorrhage (Plate XXVI. c.). Occa- ally at the time of death the congestion has ppeared, and the hæmorrhagic points alone are

Vulva.—The lips of this orifice are also as a rule e or less deeply congested; sometimes too there spots of extravasation beneath the surface of the ous membrane. The epithelial covering of the part ery frequently more or less aphthous.

Udder.—This is generally somewhat congested throughout, and sometimes contains a little thickish milk.

Male Organs.—Of these I have nothing particular to observe, excepting that the mucous membrane of the prepuce, especially near its attachment to the corona, may be intensely congested.

Condition of other Organs and Tissues.

Nervous System.—The pia-mater of the brain is usually somewhat congested. But, with this exception, the nervous centres appear to me to be healthy.

Serous membranes.—These tissues for the most part present no signs of disease—signs (that is to say) special to the cattle plague. The arachnoid membrane and the pleuræ have always seemed to me healthy. The pericardium too is generally healthy, with the exception that now and then patches of hæmorrhage are met with beneath its visceral layer. The peritoneum lastly, is generally in a natural condition. The only appearances I have observed here which can in any way be regarded as indicative of disease, are patches of redness which are occasionally visible on the surface of the great omentum, darkness or lividity of the external aspect of the small intestines when there is deep congestion within, and once or twice patches of subserous congestion and extravasation on the surface of the cœcum.

Muscular system.—The flesh appears to me to be generally quite healthy. I have no doubt that the specially educated eye of a butcher may detect peculiarities which would prevent him from regarding it as first-class beef. But by persons not thus educated, I have no hesitation in saying that it would generally be considered sound and wholesome. I have examined it occasionally under the microscope, and except that some of the fibres had now and then partially lost their transverse striation, and had become in places homogeneous and glassy, I have detected no departure from the healthy condition.* These observations do not, of course, refer to the heart, the laryngeal muscles, and the trachealis.

Adipose tissue.—With the exception that the fat disappears to a considerable extent during the illness of the animal, the adipose tissue presents no change calling for remark.

Cellular tissue. Emphysema.—The only point worthy of notice, as regards the cellular tissue, is the

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* Whilst I was engaged in writing my report, my attention was called by Dr. Fenwick to his discovery of entozoon-like bodies, in the muscles of cattle, dead of the cattle plague. I had not myself up to that time observed them; but then my microscopical examinations of the muscles had only been occasional and slight. A dearth of opportunities occurring about that time and subsequently, I was prevented from investigating the matter for myself until the 13th January. On that day I examined two heifers which had died of the plague at the Albert Veterinary college; and I found these entozoon-like or "Rainey's" bodies, as they are called, in some abundance in all their muscles that I tested with the microscope—in the muscles of the abdominal walls, in those of the neck, in the tongues, and especially in the substance of the hearts. The bodies were obviously—I need not describe them—those parasitic formations which Mr. Rainey described and figured some years ago in the Philosophical Transactions, and which he supposed to be an early stage of development of cysticerci cellulosæ. Whether they are really animal parasites as Mr. Rainey supposed, or vegetable parasites as others maintain, I am not now concerned to inquire; but that they could have little to do with the production of the disease with which they had thus been shown to be associated was on many grounds utterly improbable. In order, however, to test this point I sent at once to a respectable butcher's, and bought three healthy and fresh bullocks' hearts,—I examined them carefully with the microscope, and discovered, as I expected I should do, that "Rainey's" bodies were as abundant in each of them as I had previously found them in the hearts of the diseased heifers. The same results, I may add, have been arrived at independently by Dr. Cobbold. The discovery of these parasites so generally in the flesh of animals used for food, is a matter of some interest and one that deserves investigation; but obviously their connection with the cattle plague is only fortuitous; and in their relation to that disease they have no interest.

J. S. B., Jan. 16th, 1866.

Dr. Bristowe. Report to Commissioners.

very frequent presence in it of emphysema. This is a well-recognized feature of the cattle plague; it is generally looked for during life upon the loins; and is very frequently met with in abundance after death in the cellular tissue about the kidneys. It is often absent, however, from both these situations; and occasionally, on the other hand, it spreads over the greater part of the body. This emphysema, I believe, has been regarded almost, if not quite, universally, as the result of the disengagement of gas in consequence of some kind of decomposition of the tissues, or of certain of the tissues, of the body during life—an occurrence quite without a parallel in the diseases, even the most putrid, of the human being. I have examined the question very carefully, and am quite satisfied that this, the ordinary explanation, is entirely erroneous; and that the general emphysema, whatever its degree, is (as is the emphysema of the human subject after wound of the lung) mechanical, and produced merely by the diffusion of air through the cellular tissue of the system in consequence of its continuity, through the roots of the lungs, with the cellular tissue of the interlobular spaces of the lungs. The reasons which have led me to this conclusion are as follows:—1st, the strange singularity of the phenomenon if due to decomposition of the living tissues; 2nd, the fact that the gas effused has no ill smell whatever, and that the tissues among which it is effused are mostly if not always entirely free from the odour or appearance of decomposition; 3rd, that the emphysema is met with alone among those tissues (the muscular and cellular) which are probably least liable of all soft tissues to decomposition; 4th, that it is not increased in any degree by post-mortem decomposition. (Post-mortem changes do indeed cause disengagement of gas in connexion with several of the viscera; but such formations of gas occur in parts to which the real emphysema never reaches, and occur as much in cases where no general emphysema exists, as they do in cases where it is abundant); 5th. I have ascertained that emphysema of the loins occurs much less frequently than emphysema of the lungs, and that it never exists independently of it; and further, that the next most frequent seat of emphysema to the lungs is the cellular tissue of the root of the lungs and of the posterior mediastinum. Indeed, I do not for a moment hesitate to assert, as the result of my observations, that in all cases the emphysema begins in the cellular tissue of the interlobular spaces of the lungs, that it spreads thence to the roots of the lungs and posterior mediastinum, diffusing itself around the base of the pericardium, upwards along the œsophagus and trachea into the neck, and downwards along the œsophagus and other parts towards the abdomen; that it subsequently reaches the cellular tissue about the kidneys and that of the loins; and that its appearance in remoter regions, (as upon the face and in the thighs) is always a still later event.

The general emphysema of the cattle plague is, therefore, to be looked upon as an accident only of the disease, special to the ox, and determined in that animal by the anatomical peculiarities of its lungs. It will doubtless be found to occur in some degree in other diseases of the ox, in which the air-passages are implicated.

General Remarks.

Tendency to decomposition.—There is no doubt that animals dead of the cattle plague manifest as a rule a marked tendency to decomposition after death; but that the tendency differs very much in different cases—decomposition taking place sometimes comparatively slowly, sometimes with great rapidity. In the latter case internal organs soon become very much altered in character; and they are found at the time of examination softened, congested, or pallid, or black, according to circumstances, and sometimes emphysematous. These alterations of character have frequently been mistaken for the direct effects of disease, but they are alterations with which, and with their signification, competent pathologists are well acquainted. They are alterations which do not take place until after death, and I have, therefore, in great measure, eliminated them from the foregoing account. I may, however, briefly enumerate some of the most important of them here:—in the heart, softening of texture and blood-staining of both the inner and outer surfaces (in one case I observed numerous gaseous bullæ studding the lining membrane of the right ventricle); in the lungs, congestion and softening; in the liver, softening with pallor, and more or less blackening of some parts of the surface; in the spleen and in the kidneys, softening with increased depth of hue; in the œsophagus, rumen, reticulum and omasum, detachment and softening of the epithelial lining; in the abomasum and intestines, softening of the mucous membrane; in the blood, especially in that of the heart, liver, and spleen, the formation of bubbles of gas; in the pleuræ and other serous membranes, the presence of blood-stained serum. Most other parts of the system are less rapidly or less evidently influenced by the advance of decomposition and the muscular and cellular tissues for the most part retain their normal aspect long after the distinct establishment of putrefaction in the internal viscera.

Associated conditions of disease.—Again, in the foregoing description, I have referred rarely and exceptionally to conditions of disease, which were obviously associated accidentally only with the malady which caused death. Such (to enumerate them) are tubercular disease of the larynx, tubercular disease of the lungs, cancer of the lungs, hydatids in the lungs and liver, cirrhosis of the liver, thickening of the hepatic ducts, erectile tumours of the liver, adhesions of the pleura. Such also possibly are pneumonia, which I met with in one case, and recent pericarditis, which I discovered in another. But I know so little of the sequelæ of cattle plague, that as regards the relationship to it of the latter complications, I do not venture to express any positive opinion. It is not improbable, however, that here, as in several of our own exanthemata, there may be a tendency in the course of the disease, or during the period of convalescence, to the supervention of inflammation of various internal organs.

Relative frequency with which organs and tissues are affected.—To speak generally, the visible effects of the cattle plague are manifested chiefly in connexion with the cuticular and mucous tissues. And of these the disease seems chiefly to select the skin, and the mucous membranes of the alimentary canal and air passages, including that of the pharynx, mouth, and nose. One or more of these tracts may occasionally escape wholly, the others being at the same time seriously diseased. But in the great majority of cases all of them become affected during the progress of the malady; though which of the several tracts, and which particular parts of them, shall suffer most severely is a matter of uncertainty. The mouth and fauces are generally affected, and affected simultaneously, in those parts which I have pointed out as chiefly liable to suffer. Of the air-passages, disease is most common in the larynx and in the trachea. And of the alimentary canal the parts most prone to suffer are the omasum, abomasum, small intestine, cœcum and ascending colon, and rectum. Of these, the abomasum is certainly most frequently involved. Another appearance in this disease, as constant nearly as those which have been enumerated, but far less important, is that of ecchymoses beneath the lining membrane of the left ventricle of the heart. The genito-urinary mucous membrane seems never to be very seriously affected; morbid processes take place, however, most generally in the lower part of the vagina and vulva than elsewhere; and from the facility with which these parts can be investigated, their condition furnishes often a valuable aid to diagnosis. The lungs, with few exceptions, become more or less emphysematous.

It has seemed to me that in cattle plague disease internal organs is often aggravated, and may be determined, by mechanical or other accidental causes; su

r example as that position of parts which allows of e blood gravitating into them, the irritation of accu-ulated contents, the friction of parts against one nother, the traction of parts, and so on. Thus, sub-ucous hæmorrhage is constantly most marked in the :onchial tubes of that side on which the animal has in. Thus, the parts of the alimentary canal most equently affected are those parts—the stomach, xcum, and rectum—in which food or fæcal matter accu-ulates and rests. Thus, in the larynx, gangrene occurs ı those surfaces which are in contact ; and thus, in ıe heart, sub-endocardial hæmorrhage is always first :en at the points of the papillary muscles, where they •e attached to the chordæ tendineæ.

Nature and identity of morbid processes.—As re-ards the nature of the morbid processes occurring in is disease in the various parts of the system, there ems to be a remarkable similarity. The lesions dis-verable after death are, it is true, very diverse in :eir superficial characters, and they have called con-quently for minute description ; but the differences e for the most part modifications of result only, termined, as to any single organ, by the different grees of intensity with which it is affected, as tween various organs, partly by this condition, rtly by their respective peculiarities of anatomical ructure and function.

The identity of the disease in the skin with that in e mouth, fauces, pharynx, and even œsophagus, seems me absolute. In both there is, in the first instance, ngestion, more or less uniform, or more or less tchy ; in both, the congestion is generally super-ial ; and in both it may lead to extravasation of ood into the tissues, and to external hæmorrhage. ı both, again, the congestion is attended with in-eased, though morbid, functional activity of the neral surface, and of the glandular involutions of at surface ; and in both the earliest morbid changes e apt to take place in connexion with these glands. hus, as I have pointed out, the exudation on the in consists of shed epidermis, sebacious matter, and oups of nuclear bodies—products of the basement embrane, and especially of the sebacious glands. hus, the exudation in the mouth and pharynx consists accumulations of epithelium, of nuclear bodies, and abundant mucus, products again of the surface of e mucous membrane and of the glands connected erewith. And thus, too, in both situations the orbid processes are generally most marked where e glands are most numerous and largest.

Again, there seems to me an almost perfect identity tween the morbid processes as they occur in all rts of the alimentary canal below the œsophagus. is true that there is a greater proclivity in one part be affected than there is in another ; that the dis-se is more apt to take a certain course here than it there ; that, for example, hæmorrhage from the rface is more apt to occur in the abomasum and rts below it, than in the rumen, reticulum, and nasum ; that sloughing is more common in the omachs than it is in the bowels ; and that the slough-g, which is generally very superficial in the aboma-m, and leaves but slight traces, in the omasum leads complete perforation of the folds and permanent formity. But the essential nature of the processes hich lead to these varied results is in all cases evi-ntly the same. They consist, in the first place, intense capillary congestion ; in the second place nerally, in effusions of blood, sometimes into the bstance of the tissues, sometimes from the surface ; the third place, in gangrene, which never occurs t after congestion, and generally, I believe, after cape of blood into the tissues ; and finally, in the paration of the sloughs and the cicatrization of the xcavated surface.

In the air-passages, again (and in a less degree in e genito-urinary mucous membrane), the phases of sease are identical throughout, and identical with ose presented by the alimentary canal. In the air-assages, congestion and hæmorrhage, both into the ssues and externally, are the conditions usually ob-served. Gangrene here is rare ; but nevertheless it does occasionally take place.

I have dwelt specially upon the very close resemblance which seems to me to exist, in the cattle plague, between the disease in the skin and that in the mouth, fauces, pharynx, and œsophagus. I have also dwelt specially upon the identity of the morbid processes which take place in the mucous membranes of the stomachs and intestines, air-passages and genito-urinary organs. It remains for me to point out that there is also in reality a close resemblance between the diseased conditions manifested by the former group of membranes and those manifested by the latter, as appears from the fact that the mucous membranes generally exhibit, besides congestion and tendency to hæmorrhage, the same increased activity of surface and of the glandular elements connected therewith, which I have remarked upon as characterizing the affection of the skin and of the mouth. This is proved by the abundant discharge which takes place from the nose ; by the abundant mucous secretion which is poured out along the alimentary canal, from the abomasum downwards ; by the copious vaginal discharge ; and by the usually large secretion of unhealthy mucus which occurs at the surface of the larynx and of other portions of the respiratory mucous membrane.

Other lesions, which are common in the disease, if not specific, are (with the exception of emphysema) due simply to hæmorrhage ; such are the ecchymoses beneath the endocardium and pericardium, and the effusions of blood into the laryngeal muscles and elsewhere.

I may add here, that in all the diseased mucous surfaces, those of the mouth and alimentary canal, those of the air passages and others, I have almost invariably found, and often in great abundance, large crystals which have the form and general character of crystals of triple phosphate.

Rapidity of repair in diseased tissues.—It is very curious, considering the tendency there is to the formation of sloughs, how rapidly parts heal, even during the progress of the disease towards a fatal issue. Thus (as I have pointed out) we constantly find in the abomasum shallow depressions in the mucous membrane which are manifestly the cicatrized, or cicatrizing, excavations whence sloughs have recently separated, and we find them constantly associated with sloughs in other parts of this stomach ; again, we not very unfrequently find the edges of perforations of the folds of the omasum cicatrizing or healed, whilst sloughing is still in progress in other parts of the folds. It is remarkable, too, how rapidly, on the supervention of convalescence, the mouth and other organs regain their original healthy condition. This is due in great measure, no doubt, to the little depth to which for the most part the morbid processes extend.

Effects of internal lesions on progress and event of cattle plague.—Assuming that this disease is often fatal, as different kinds of fever constantly are, through its more occult influences on the system, there is still little doubt that the serious lesions which take place in connection with the alimentary canal and the organs of respiration are sufficient often of themselves to insure a fatal event. The congestion, hæmorrhage, and sloughing which appear so frequently throughout the alimentary canal would assuredly, if they existed independently of all other disease, be occasionally sufficiently serious to cause death. The morbid conditions of the respiratory apparatus must be still more deadly. For the diseased animal suffers frequently from the combined effects of laryngitis, croup, and bronchitis, either of which affections is highly dangerous ; and it suffers further from the effects of the pulmonary emphysema, which, when considerable, must necessarily interfere seriously with respiration. When we consider the many risks which cattle affected with the plague thus necessarily have to incur, the deadly character of the disease can scarcely be matter for surprise.

Dr. Bristowe. Report to Commissioners.

Essential Nature of Cattle Plague.

The question now naturally arises: What is the disease the morbid anatomy of which I have described? That it is the steppe murrain or the rinderpest—the disease which raged in this country in the last century, and constantly prevails in the steppes of Central Asia—admits of no doubt. The numerous accounts, published here and abroad, though written with various degrees of fulness, and various degrees of accuracy, agree substantially with the observations, pathological and other, which have been made upon the present epidemic. So much is certain. But what is the rinderpest or steppe murrain? Considerations derived from the morbid anatomy alone of the disease indicate clearly that it is a specific disease belonging to the group of the exanthemata; and what is known of its history and progress establishes its exanthematous character beyond the possibility of doubt. It is (like other members of the group) a specific disease, communicable by contagion, occurring, as a rule, only once in a lifetime, attended with a special cutaneous eruption, and with certain characteristic internal lesions,—lesions, however, characteristic rather by their great extent than by any intrinsic character.

The exanthemata form a kind of fraternal group, the members of which are all perfectly distinct; but of which certain members (without in any degree losing their individuality) have a closer resemblance to each other than they have to the remainder of the group. Which, if any, of human exanthemata does the cattle plague resemble? The disease has been called the "contagious typhus of horned cattle," but there is certainly little in common between these two diseases. No one, in fact, acquainted with their pathology could possibly confound them, or could have dreamt of borrowing the name from one to apply it to the other. It has lately also been assumed to be identical with typhoid or enteric fever. This assumption, however, is even more unfounded than the last, and can only have been made in entire ignorance of facts. Typhoid fever is very slightly infectious, is attended with a very trivial eruption, and is invariably accompanied by disease of Peyer's patches and of the mesenteric glands—the only specific internal lesions. In all these respects, and in others, it differs utterly from the cattle plague.

There are, however, two diseases of the human being to which the cattle plague has a distinct resemblance; these are diphtheria and small-pox.

The resemblance to diphtheria lies in the facts:—that in diphtheria, as in the cattle plague, there is inflammation of the fauces, with exudation on the surface; that these affections tend to pass down the larynx and trachea into the bronchial tubes, and also along the œsophagus; that diphtheritic exudations may form in other parts of the system of mucous membranes; and that extravasations of blood may occur into the tissue of the heart, and in various other situations. The distinctions between the two diseases, however, are well marked, and there is no real possibility of confounding them. They differ (to speak still only of their morbid anatomy) materially in the character of their respective exudations on the mucous membranes, and irreconcileably in the nature of their cutaneous eruptions.

The resemblance between the cattle plague and small-pox in the human being is much more close; and this resemblance was recognized by physicians in the epidemic which prevailed in this country a century ago. At the very first post-mortem examination which I made of a diseased cow (at a time when I was perfectly ignorant of the presence of any eruption on the skin), the close resemblance between the internal lesions which accompany small-pox and those which characterize the cattle plague struck me forcibly, and subsequent experience confirmed this impression. Indeed, allowing for the absence in the human being of the first three stomachs of the cow, the description of the internal lesions in a severe case of small-pox might fairly pass for that of the lesions belonging to the cattle plague. There is the same congestion and change in the character of the epithelium, with tendency to excoriation, in the mouth and pharynx; the same congestion of the larynx with formation of pseudo-false membrane, and tendency to the extension of these conditions into the trachea and bronchial tubes; the same tendency to hæmorrhage beneath or into the mucous membrane of the stomach (the homologue of the abomasum); the same tendency to congestion and submucous extravasation in connexion with the mucous membrane of the bowels, especially that of the large intestine; the same tendency to similar affection of the mucous membrane of the bladder and of associated parts; the same tendency to hæmorrhage in connexion with the investing and lining membranes of the heart; the same unusual fluidity of blood. There is also, as I have pointed out, a *primâ facie* resemblance between the eruption of small-pox and that of the cattle plague; but I am bound to confess that, so far as my present experience goes, it is adverse to their actual identity. I have failed hitherto to detect in the eruption of cattle plague either a distinct vesicle or a distinct pustule, and certainly nothing like the umbilicated pustule of well-marked cow-pox or variola. I have failed also to observe that equality in the development of its spots of eruption which prevails in small-pox. On the contrary, the eruption in cattle plague, even when most marked, exists at the time of death in every variety of stage; and further it is attended with an amount of affection of the sebacious glands which in small-pox is without a parallel. My personal acquaintance, however, with the minute anatomy of the eruption of small-pox, excepting with so much of it as is learnt clinically, is unfortunately limited. There may be peculiarities about it to be revealed by minute examination, which would lead me to see between the two eruptions a closer affinity than I can yet acknowledge. One thing, however, is certain, viz., that if the cattle plague be small-pox, it is small-pox with the most characteristic feature of small-pox strangely modified. Its eruption is certainly not the recognized typical eruption of either variola or vaccinia.*

January 5th, 1866. John S. Bristowe.

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* Since the above report was written I have, through the kindness of Mr. Marson, and with the assistance of my friend Mr. Wagstaffe of St. Thomas's hospital, had the opportunity of examining *post mortem* four patients who had died of small-pox at the Small-pox and Vaccination hospital. An abstract of the morbid appearance observed in each case is added. The results of these examinations tend generally to confirm the statements which are made in my report in reference to the resemblances and differences between cattle plague and variola. But they enable me to go more minutely into some of these points: First, *as regards the skin:* the pustules of small-pox present, I need scarcely say, the umbilicated form which has been always ascribed to them, they present in each case a marked uniformity of size and development, and they are distinctly pustular (or at least the matter which they contain is always distinctly covered with a thin layer of epidermis). In these respects the eruption of small-pox differs entirely from that of the cattle plague. On the other hand the contents of the variolous pustule form a more or less coherent elastic (mucus-like) mass consisting of corpuscles much like those of cattle plague, and this is prolonged into the hair sheaths and sebacious follicles: moreover the surface of the true skin is either not destroyed or is destroyed very superficially. In these respects there is some resemblance between the two diseases. But I must observe further that there is a remarkable difference between them in the relative degrees in which pus is produced and the sebacious glands are affected. Second, *as regards the mouth and pharynx:* these parts become affected in variola much as they do in cattle plague, but the affection is more markedly pustular in the former disease than in the latter, or at all events appears in the form of spots very much like in size and shape to those of the external eruption. Third, *as regards the air passages:* the morbid processes which occur in these parts in small-pox do not consist in mere congestion and sub-mucous hæmorrhage, but in the development of an eruption also much like that of external parts. Fourth, *as regards other internal organs:* congestion and hæmorrhage, although they occur in many cases of small-pox, do not seem so common as they are in the cattle plague.

Besides the abstracts of the four cases above referred to, I have added to this note the abstract of a fifth case which I examined a few years ago.

UPPLEMENTARY REPORT ON THE MORBID ANATOMY OF THE CATTLE PLAGUE, AS IT OCCURS IN SHEEP, GOATS, AND DEER.

ENTLEMEN,

IN the hope that I should be able to add to the mber of my post-mortem examinations of sheep, goats, d deer, which had died of the cattle plague, I have layed furnishing you with my report on the morbid atomy of the disease as it occurs in these animals. My lay has hitherto proved fruitless, and as I see no im-diate prospect of obtaining additional materials for r report, I feel that it is my duty to place in your hands such information on the subject as I possess, incomplete though that information unfortunately is. The number of post-mortem examinations, which I have made of each of the above-named species of animals, is far too small to allow of any generalization with regard to the distribution and intensity of morbid processes occurring in them severally; but it is sufficiently large to establish (if need were) on anatomical grounds alone, that they are each of them liable to be attacked with "cattle plague," and when dead of the disease present its characteristic lesions.

I remain, Gentlemen,
Your obedient servant,
8th Feb. 1866. JOHN S. BRISTOWE.

(1.) MORBID ANATOMY OF CATTLE PLAGUE IN SHEEP.

I have had the opportunity of examining eight sheep only, and from these examinations am led to believe (what has already been remarked on by other observers) that the disease in these animals is generally much milder than it is in oxen, and that the lesions discoverable after death (though of the same character as those in oxen) are generally much less extensive and much less advanced.

Skin.—I have not observed any cutaneous eruption; but have only searched specially for it in one animal.

Mouth, fauces, and pharynx.—These parts I have generally found quite healthy. I have once only seen some congestion at the back of the tongue and about the pillars of the fauces; and twice, aphtha-like spots upon the dorsum or the root of the tongue. Once too I have observed similar spots on the palate. But I

No. I.—Elizabeth W., æt. 21. Examined Jan. 19, 1866. nfluent. Unvaccinated. Taken ill Jan. 2. Spots Jan. 5. d Jan. 16.

SURFACE.—Covered with confluent scabbed eruption on face, d, neck, sides, and back; elsewhere discrete and not scabbed.

RESPIRATORY ORGANS.—*Larynx and Trachea* much con-ted, covered with copious tenacious mucus; above the vocal ds the colour of surface was rather livid, and less intensely than lower in trachea. Extending from upper limit and reasing downwards, were numerous patches of excoriation, e circular and the size of skin-pustules, covered also with iform secretion; the rest larger, more confluent, and more gular. The smaller bronchial tubes were only deeply con-ted. No ecchymoses connected with trachea.—*Pleuræ* lthy.—*Lungs* congested and œdematous.

CIRCULATORY ORGANS.—*Heart, &c.* healthy, apparently. Blood ending larger veins, black, and semi-fluid.

ALIMENTARY ORGANS.—*Palate*, mucous membrane much ex-iated in distinct shallow rather circular patches; much dirty kening of epidermis on tongue.—*Pharynx*, epithelium peeled to nearly half its extent, or in some places, raised and shreddy; er down in œsophagus epithelium still more destroyed, and else-ere covered with yellow lymph-like layer, which scraped off y readily, leaving denuded surface (this yellow covering ned altered epithelium); this condition ceased abruptly at mach.—*Stomach* containing tenacious mucus.—*Intestines*, tary glands very marked but not ulcerated, Peyer's patches y distinct. Ileum deeply congested throughout to within inches of cœcum; ascending colon congested.—*Liver* healthy, bladder distended.

No. II.—William F., æt. 25. Examined Jan. 19, 1866. Con-nt unmodified. Vaccinated, one minute cicatrix. Ill, Dec. 30. ts, Jan. 1. Died, Jan. 14.

SURFACE.—Covered with foul scabbed and suppurating erup-, especially on head; only less on abdomen.

RESPIRATORY ORGANS.—*Trachea and Larynx* deeply con-ted, livid towards vocal cords; no excoriation in distinct ches, but a general irregularity of surface within the con-ted area.—*Bronchial tubes*, large and small, contained a large ntity of dark matter apparently foul tenacious muco-pus; much congested.—*Lungs*, right, adherent towards back and er part; both deeply congested and œdematous, but crepitant art.

CIRCULATORY ORGANS.—*Heart* healthy.—*Blood* very dark, ending larger veins, semi-fluid; much black clot in both icles; firmer and more decolourized in ventricles.

ALIMENTARY ORGANS.—*Tongue* denuded of epithelium in ches at the sides; dorsum much thickened and cracked by in-ase of epithelium; islands of hypertrophied epithelium remain-and presenting the appearance of papular eruption.—*Palate* oriated, livid.—*Pharynx*, epithelium peeled off to a rather aller extent than in I., shreddy and separated more cleanly ve, but to a larger extent below, with yellow softened racter in those portions remaining.—*Stomach* apparently lthy, but containing tenacious mucus.—*Intestines*, solitary nds not marked; Peyer's patches distinct. Ileum deeply gested in lower portion towards cœcum.—*Liver* healthy, ge; gall bladder full.—*Spleen* much enlarged, soft.

URINARY ORGANS.—*Kidneys, supra-renal capsules and dder* healthy; urine turbid.

No. III.—Lois E., æt. 9. Examined, Jan. 19, 1866. Confluent. vaccinated, cut for cowpox in infancy, without effect. Ill, n. 6. Spots, Jan. 8. Died, Jan. 17.

SURFACE.—Eruption confluent, scabbing, especially in upper rts and sides; surface livid.

RESPIRATORY ORGANS.—*Larynx and Trachea* much excoriated circumscribed and confluent patches, best marked towards er part, but extending even into larger and smaller bronchial es, some on vocal cords; deep congestion of the whole eous tract of air passages, which contained tenacious muco-rulent secretion.—*Lungs* œdematous and congested; deep gestion, almost amounting to ecchymoses, between trachea œsophagus.

CIRCULATORY ORGANS.—*Heart*, pericardium distended with id; no appearance of lymph on surface; no adhesions nor ecchymoses.—*Blood* black, semi-fluid in large veins and auricles; firm decolourized clots in ventricles.

ALIMENTARY ORGANS.—*Tongue* as in Case I.—*Palate* excoriated in numerous spots.—*Pharynx*, mucous membrane peeling, one small spot of ulceration found in the pharynx close to the upper extremity.—*Stomach* apparently healthy, but its surface thickly covered with tenacious mucus. *Ileum* congested above cœcum for some distance.—*Peyer's patches* marked, solitary glands not.—*Liver* enlarged, healthy; gall bladder full.—*Spleen* small, rather firm.

URINARY ORGANS.—*Kidneys* greatly enlarged, pale.—*Bladder* healthy, urine turbid.—*Vagina* congested towards ostium.

No. IV.—Henry P., æt. 17. Examined, Jan. 19, 1866. Vaccinated, very doubtful cicatrix. Confluent, unmodified. Ill, Jan. 5. Spots, Jan. 7. Died, Jan. 17.

SURFACE.—Eruption not quite so abundant or confluent as in I., II., III.

RESPIRATORY ORGANS.—*Larynx* deeply congested, the congestion being traceable from mouth; excoriation on vocal cords; no excoriation in lower part of trachea or bronchial tubes; no mucus; no marked congestion.—*Lungs* healthy.—*Left pleura* with old adhesions below.

CIRCULATORY ORGANS.—*Heart* healthy.—*Blood* semi-fluid, black; clots in ventricles large and jelly-like.

ALIMENTARY ORGANS.—*Pharynx* not denuded.—*Stomach* apparently healthy, but containing sticky mucus.—*Intestines* not materially congested.—*Liver* not large, gall bladder full.—*Spleen* healthy.—*Mesenteric glands* much enlarged and prominent.

URINARY ORGANS.—*Kidneys* healthy, urine turbid.—*Bladder* healthy and distended.

No. V.—Short notes of post-mortem examination of a case of small-pox which occurred in St. Thomas's Hospital in March 1859. *The case was very rapid in its course and severe.*

James M'K., aged 16.—*Skin*, confluent hæmorrhagic eruption.—*Back of tongue, palate, fauces, &c.*, covered with a thin layer of pseudo-false membrane, and congested.—*Larynx and trachea* similarly affected.—*Bronchial tubes* congested, and containing much muco-purulent fluid.—*Lungs* congested, with pneumonia at base of left.—*Pleuræ* presenting petechiæ and ecchymoses of subserous tissue.—*Heart* soft and pale, petechiæ and ecchymoses, both internally and externally; cavities nearly empty.—*Pericardium* healthy.—*Peritoneum* presenting sub-serous extravasations.—*Liver* pale and soft; two or three ecchymoses on surface.—*Spleen* dark and pulpy.—*Pancreas* healthy.—*Stomach* congested and studded thickly with submucous extravasations.—*Small intestines* healthy.—*Large intestines* congested and studded thickly with submucous extravasations.—*Kidneys* pale; capsules and submucous tissue infiltrated with blood.—*Bladder* containing several ounces of bloody urine; mucous surface studded with petechiæ.—*Supra-renal capsules* healthy.—J. S. B., Jan. 22.

have not met with any such affection of the lips, gums, and tip of the tongue.*

Œsophagus, rumen, and reticulum.—These organs have in no case been diseased.

Omasum.—The contents of this stomach have always been soft. The stomach itself has mostly been quite healthy. In one instance, however, the folds had sloughed extensively, the process of sloughing having commenced apparently at the free edges; and in two cases, there was (what probably was an early stage of the same affection) slight circumscribed congestion of the free edges of two or three of the folds.

The *abomasum* was in every instance more or less congested, and in several cases the congestion was distinctly patchy. In three cases the congestion was deep, and in two of these there was some membraniform exudation on the surface of the mucous membrane; in two, there was commencing ulceration; and in one, sub-mucous extravasation of blood.

The *small intestine* presented in most cases patches of congestion. In one case the duodenum was intensely congested; in one the ileum; and in this case hæmorrhage had taken place into the bowels. Peyer's patches were without exception healthy.

Large intestine.—The cœcum, like the abomasum, was in every case congested to some extent; and here too the congestion was apt to be patchy. In two instances the congestion was deep, and in one of these there was some lymph-like exudation on the surface. The ascending colon was several times more or less congested; and in one or two cases there was some congestion of the rectum. But generally the latter portion of the gut was pale and healthy. The anus was invariably healthy.

The *larynx and trachea* were in several cases somewhat congested. But I never met with deep congestion here, and never with sub-mucous extravasation of blood. They contained occasionally some frothy mucus.

The *bronchial tubes* were mostly in the same condition as the upper air-passages.

The *lungs* were often somewhat congested, and once presented a few patches of what looked like pulmonary apoplexy. There was never any interlobular emphysema.

The *heart* was generally pretty healthy, but in three cases presented extravasations of blood under the lining membrane of the left ventricle, and in one case petechiæ on the external surface. The cavities always contained coloured coagula.

The *genito-urinary organs*, and indeed all organs which I have not specially named, have seemed to the naked eye perfectly healthy.

I may add that I have in no instance observed even a trace of general emphysema; and that there is in these animals, after death from cattle plague, the same tendency to rapid decomposition which I have shown to exist in cows which have died of the same disease.

(2.) Morbid Anatomy of Cattle Plague in Goats.

I have only been enabled to make two post-mortem examinations of goats. That these died of the cattle plague, the history appended to the details of the post-mortem examinations, and the lesions discovered after death, leave little room for doubt. At the same time the lesions were few and slight.

In one of the goats there was slight congestion of the larynx and other air-passages (with accumulation of much frothy mucus), slight congestion of the lungs and petechiæ at the apex of one of the pleuræ. In the same case there were petechial spots on the outer surface of the heart, congestion of the abomasum, deep patchy congestion of the cœcum, and slight congestion of the remainder of the large intestine, including the anus. In the other goat there was some congestion of the ileum and of the cœcum, congestion of the anus, and congestion of the vulva, with a granular condition of its epithelium. In both cases the contents of the intestine were peculiarly fluid, and in both there were superficial sloughs either of the lips of the ileo-cœcal orifice or of the neighbouring parts of the large intestine.

Neither of these animals presented any unhealthy condition of the lips, gums, tongue, palate, fauces, or pharynx; and in neither of them was there any emphysema or any cutaneous affection. I know, however, that goats may present the lesions of cattle plague in more characteristic form, and that they are liable to the specific eruption of the disease.

(3.) Morbid Anatomy of Cattle Plague in Deer.

I have examined but one deer dead of cattle plague and that was, at the same time, far advanced in tubercular disease. This animal, however, presented unmistakable symptoms of the disease during life, and unmistakable indications of it after death.

The larynx, trachea, and bronchial tubes were all deeply congested; and in the larynx were points of submucous extravasation of blood. The abomasum presented many small superficial sloughs (Plate XXV c.) and excoriations. The mucous membrane of the small intestine was intensely congested, and reduced to a pulp and there was also deep congestion of the cœcum and ascending colon. The contents of the small intestine were tinged with blood.

The lungs, the tonsils, and the bronchial and mesenteric glands were tubercular in a very high degree; but the tubercular deposits were limited to these organs. The mouth and all parts connected with it were healthy; the skin was entirely free from eruption; and there was no emphysema, either pulmonary or general.

J. S. B.

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* For representations of well-marked disease of the organs spoken of in the above paragraph, *see* Plates XXVII. and XXVIII., which have been copied from drawings kindly lent for the purpose by Mr. Ceely. The morbid changes which they illustrate will be seen, on comparison, to be identical with those occurring in cattle, and figured in Plates IV. and V.

Plate XXVII. represents a section of the brain, the interior of the nose, the tongue, the fauces, and the upper orifice of the larynx. The mucous membrane of the nose is deeply congested, as also is that of the larynx, and the tongue and fauces are congested, aphthous, and excoriated.

Plate XXVIII. represents the roof of the mouth, showing thickening of epithelium, excoriation, and congestion.

The following account of the case from which the drawings were made has been furnished by Mr. Ceely:—

"The sheep was a "wether hoggett," aged 10 months, the property of Mr. John Savory, of Sparham, Norfolk. It was one of a flock of 10 score, which in September last was put into pasturage adjoining that in which were cattle affected with Rinderpest, the owner not then being aware of the susceptibility of sheep to that disease. A few weeks afterwards the sheep began to die, and the skins that were removed from the carcases were deposited in a shed adjoining healthy cattle, which soon afterwards became affected with Rinderpest.

"The disease continued to spread among the sheep till December, at which time 52 had died, several that had been attacked had recovered, and some were still unaffected.

"The sheep from which the drawings were made had the following symptoms: loss of appetite, tendency to separate itself from the flock, cessation of rumination, cough, discharge from the eyes and nose, great congestion of all the visible mucous membranes,—buccal membrane inflamed and furred, and inside the upper and lower lips a well-marked eruption,—moaning while lying down, head and ears depressed, a peculiar shaking of the head and shoulders, offensive diarrhœa, and all the usual signs of Cattle Plague.

"It survived about six days.

"*Post-mortem appearances.*—Besides those so accurately delineated in the drawings, there was much congestion of the trachea, and also of the lungs, but no emphysema. The mucous membrane throughout the alimentary canal was highly congested, particularly that of the 3rd and 4th stomachs. The mucous folds of the rectum were intensely congested.

"The cutaneous eruption was well developed in this animal. The greater part of the surface of the skin displayed a vivid red appearance, and the papular eruption of the poll, the neck, along the back, the lumbar region, and the tail, and on the thighs, was as well developed as on cattle."

J. S. B.

Details of Post-Mortem Examinations of Cattle.

1.) A Cow, 4 or 5 years old.—Royal Veterinary College.—Admitted October 16th, died and examined October 20th. Said to have been attacked the day before admission.

The posterior half of the *palate* (including the *soft palate*), he *pillars of the fauces*, the *pharynx*, and the posterior hird of the *tongue* (including the anterior surface of he epiglottis) were very deeply congested and otherise unhealthy. The congestion was most intense about he central part of this region, where also it had a ottled character, caused by the surface being studded ith somewhat prominent patches of increased congestion. ver those regions in which the congestion was most ronounced, the epithelium had in great measure disppeared; and where it had not disappeared, adhered ightly to the surface in the form of opaque granular akes, which tended to assume a reticulated arrangement. n the fossa between the epiglottis and the base of the ngue the epithelium formed transverse ridges of consirable thickness. Beyond the limits of the regions just nsidered, that is to say, on the anterior half of the palate, n the tip, sides, and under surface of the tongue, and on e *lips* and *gums* were numerous rounded excoriations, om half an inch in diameter downwards, from which the ithelium had disappeared, and where the exposed mucous embrane was congested.

The mucous membrane of the *œsophagus* was generally ile and tolerably healthy. It was studded however, pecially in its lower part, with elongated, almost linear coriations, from half an inch in length downwards. The ucous membrane immediately around them was a little anular, and the excoriations themselves had perforated e epithelial layer, and possibly to a slight extent the bjacent membrane.

The mucous membrane of the *larynx* in its whole extent as tumid and deeply congested; the congestion was patchy, d there were many large irregular spots in which the mucous embrane was elevated, granular, and almost black. In ont of and below the arytenoid cartilages, and also midway tween the base and apex of the epiglottidean cartilage, ese appearances were well marked, and the epithelium in ese situations formed opaque granular friable patches. emorrhage had taken place from the surface, and coala still adhered to it. Throughout the *trachea* and *onchi* the mucous membrane was thickly and pretty iformly studded with points and short vertical lines of ense, almost black, congestion, which had a tendency to come clustered in patches of various extent. Some ody fluid and mucus were discovered in these tubes.

Pleuræ healthy. The *lungs* were crepitant throughh, or nearly so, and somewhat congested. There was neral interlobular emphysema. The *bronchial tubes* conned a good deal of frothy mucus, and their lining mem.ne was congested like that of the windpipe, but in a less gree.

Pericardium healthy. *Heart* generally healthy. Muscar tissue firm. The inner surface of the left ventricle s studded with numerous and large patches of subocardial extravasation. These were most numerous in posterior aspect and in connexion with the papillary scles. The blood infiltrated to some depth the subent muscular tissue. The other cavities were healthy.

Peritoneal surface a little redder than natural, and the face of the great omentum was studded with a tolerable mber of small congested fringe-like patches. The *liver* of natural size, but somewhat pale and soft. The *bladder* was greatly distended with rather thin bile. *een* larger than natural, and a little softened at both cemities, otherwise healthy.

The *rumen* contained a large quantity of unusually fluid d. The epithelium was generally less adherent than ural, and on removal the mucous membrane was found ttle pinker than in health.

In the *reticulum* the epithelium was also less adherent n natural.

The *omasum* was enlarged and contained a considerable ntity of hard ingesta. The epithelium adhered to the l, with the cakes of which it was in almost all cases oved. Many of the folds were slightly congested; the gestion forming irregular diffused patches of consible extent, but of little intensity.

The *abomasum* was dilated, and full of thin food mixed arently with mucus. The mucous membrane was ewhat softened, and towards the pylorus mammillated. It was congested throughout; but the congestion was deeper in some places than others, and the surface of the mucous folds was studded with clusters of small deep red spots, in which the mucous tissue appeared slightly thickened, and somewhat granular. The spots in the centres of these groups had coalesced more or less completely. At the pyloric end there were several irregularly roundish, somewhat depressed patches, which were more deeply congested than surrounding parts, and in which it seemed as though the mucous membrane itself (or rather its epithelial layer) was somewhat eroded. The *small intestines* presented occasional tracts of not very deep congestion; but there was no ulceration; and *Peyer's patches* were healthy. The *cæcum* and the *rectum* were both more congested than natural; and the *colon* presented numerous longitudinal bands of congestion. *Anus* slightly congested.

The *uterus*, which was healthy, contained a half or two-thirds grown fœtus. This was carefully examined, but presented no traces of the disease which had been fatal to the mother; indeed it was evident that it had been dead some days, and had probably died at an early period of the mother's illness. It was partly decomposed. The cuticle and hoofs peeled off with great facility. The serous cavities contained some blood-stained serum, and the viscera were all pulpy.

The *vagina* was healthy, or at most a little congested. The *vulva* was also slightly congested.

The *kidneys* were healthy, and their pelves pale. The *urinary bladder* was healthy.

The flesh of this cow was altogether healthy. A little emphysema was discovered in the region of the kidneys.—J. S. B.

(2.) Cow, examined October 21, 1865.—Royal Veterinary College.—Came from King Street, Camden Town.

Mucous membrane of *lips*, *gums*, *tongue*, *palate*, *oral cavity* generally, and *pharynx*, pale, free from excoriations, and indeed, so far as could be seen, perfectly healthy, with the exception that the *tonsils* presented a few traces of old disease. The *gums*, *lips*, *base of tongue*, and *soft palate* were examined with special care, and certainly manifested no traces of disease.

The left vocal cord presented, partly embedded in its substance, partly free, an oval patch of tubercle, about one-third of an inch in average diameter; and that portion of the opposite vocal cord, which had during life been in contact with this patch, was congested; the *larynx* was otherwise healthy. The mucous membrane of the upper part of the *trachea* presented a few groups of spots and longitudinal streaks of congestion; but the rest of the tube was merely somewhat more rosy than natural.

Pleuræ healthy. The anterior portions of the upper lobes of both *lungs* were collapsed, carnified, and free from air; and the anterior half of the middle and lower lobes of the right lung was the seat of abundant tubercular deposit. The remainder of both lungs was crepitant, and the tissue did not appear more congested than natural. Both organs presented very extensive interlobular emphysema. This condition was observed throughout the lungs, but was (I think) most abundant in their lower portions.

The *bronchial tubes* generally were little or not at all congested, but contained a good deal of frothy mucus; but the bronchi and a few of the larger tubes immediately connected with them were studded pretty thickly with points and patches of congestion, in which the mucous membrane was thickened and elevated. The larynx, trachea, and all the larger bronchial tubes contained a good deal of *gruel*. The *bronchial glands* were large, soft, irregularly but deeply congested, and without tubercles.

Pericardium healthy. The muscular tissue of the *heart* was firm, and generally healthy. The lining membrane of the left ventricle presented several patches of sub-endocardial extravasation. All the cavities contained large coloured clots, as did the aorta and other large vessels.

Peritoneum healthy. *Liver* a little softer than natural, otherr wise healthy. The *gall bladder* was full of not unhealthy bile. *Spleen* a little smaller than natural, and a little softer. *Pancreas* healthy.

The *rumen* contained a large quantity of natural food. The epithelial lining was generally firmly adherent to the subjacent membrane, which latter (except that it was a little pinker than natural) seemed generally healthy. In the supro-anterior division (the smooth portion) over a surface five or six inches in diameter, there was a considerable amount of disease; the disease consisting in the presence of circumscribed dirty greyish-looking sloughs (Plate

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VII.) surrounded by a margin of tumid and congested mucous membrane; the two being separated from one another, more or less perfectly, by an ulcerated fissure or line of demarcation. These patches were 14 or 15 in number, and varied from a quarter of an inch to an inch in diameter. The smaller ones were circular or oval, the larger irregular or sinuous, and formed evidently by the coalesence of several contiguous smaller ones. The sloughs occupied the whole thickness of the mucous and sub-mucous tissues, and had separated here and there to a slight extent from the underlying muscular coat. The rims of thickened mucous membrane around these sloughs were generally congested, and increased in congestion up to the very line of ulceration which defined the sloughs, where it was generally very vivid. In some instances the thickened membrane was pale throughout. 'Throughout the rest of the rumen there were also numerous diseased patches (perhaps a dozen), varying from six inches or more in diameter, to an inch. The smaller ones were circular, the larger irregular in shape. (Plate VIII.) Throughout these patches the papillæ were generally flabby and soft, and had a dirty ashy colour; but scattered amongst these were a few papillæ, which were deeply congested, plump, and evidently distended with some kind of exudation. On making vertical sections through these patches, the mucous and sub-mucous tissues were found to present numerous points of congestion; and similar points were seen in some cases to extend into and even through the muscular coat as well. In many places, but not uniformly, tracts of the mucous membrane included in the above patches, were found bloodless, and of an opaque yellowish tint, evidently sloughy, and in some cases becoming separated by a line of demarcation from the surrounding and subjacent tissues. The peritoneal membrane corresponding to these patches was healthy.

The *reticulum* was healthy.

The *omasum* was of natural size, and contained little food, and that scarcely adherent to the mucous surface. The epithelium was almost everywhere rather firmly attached to the basement membrane. The folds of the omasum, however, were diseased to an extreme degree. Many of these presented circumscribed congested patches, which varied in shape, and in area from that of a sixpence to that nearly of the palm of the hand. The central region of some of these patches was greyish and soft and sloughy; but in the majority of cases actual perforations existed in this situation, sloughs having become partially or wholly detached. The margins of these perforations were either irregular and shreddy, or had still attached to them at certain points sloughs (occasionally of considerable size) or were undergoing cicatrization, and presented tumid and congested, irregularly scalloped, yet smooth edges. The holes just referred to varied from an inch or two in diameter to that of a probe, and the mucous membrane around them, and more especially round those undergoing cicatrization, was smooth, devoid of epithelium, and nearly devoid of papillæ. The disease in many cases had affected only the more central portions of the folds, but in the majority had involved the free borders too. In the latter case the sloughs had disappeared and the folds were remarkably altered, presenting large irregular excavations, with rounded, tumid, congested, but generally cicatrized margins. These margins were frequently interrupted by irregular tongue-like projections of tolerably healthy tissue. It should be added that marginal excavations and perforations frequently co-existed in a fold, and combined to produce very complicated and strange appearances. (Plate XI.)

Abomasum. The contents pretty healthy, but more fluid than usual. The mucous membrane was perhaps redder than normal, but tenacious and for the most part healthy. In a length of about six inches in the neighbourhood of the pylorus were several (about half a dozen) sloughy ulcers, round or oval, and varying from about half or three-quarters of an inch in diameter downwards. These consisted of greyish sloughs, involving the mucous and sub-mucous tissues, adherent to the muscular coat, but separated by a groove of ulceration from a tumid but uncongested rim of mucous membrane. The free edge of one of the folds of the abomasum had evidently been ulcerated in a length of three or four inches, but had almost perfectly cicatrized.

Small intestines for the most part healthy. Here and there the mucous membrane was somewhat more congested than natural, and there were two or three spots of circumscribed and rather deep congestion. *Peyer's patches* were a little honeycombed, slate coloured, but otherwise healthy, and totally free from deposit of any kind, and from ulceration.

The large intestines and the *cæcum* were more or less congested, especially the latter; but here again there was no trace of ulceration. The lower part of the *rectum* was more deeply congested than other parts of the large intestines, but congestion was not intense even here.

Kidneys healthy. *Bladder* contracted; mucous membrane healthy.

Uterus and *vagina* perfectly normal. *Vulva* not congested.

The *flesh* of this cow was quite healthy-looking, and free from all signs of decomposition. There was a good deal of general emphysema, and a large accumulation of gas in the cellular tissue about the kidneys.

The papillæ in the central part of the dorsum of the tongue were remarkably elongated and horny, and those at the upper orifice of the omasum were converted into small curled horns, averaging half or three-quarters of an inch long.

Microscopical examination (after being in spirit).—The diseased papillæ of the *rumen* presented the following characters:—1st. Those that were plump and congested contained distinctly in their substance a large amount of blood (not, so far as could be seen, extravasated), and compared with the healthy papillæ were very opaque. The epithelium covering them moreover was opaque and granular, and presented numerous filaments of a branching jointed vegetable fungus, averaging (to speak roughly) about 1-3000th inch in diameter. 2nd. The papillæ that were shrivelled and limp were also very opaque and granular, but presented no special elements different from what were seen elsewhere. The epithelium here also was opaque and granular, and presented numerous filaments of fungi.

The diseased patches of the omasum presented for the most part a somewhat adherent epithelial covering, which was found to be thickly studded with the same kind of fungous growth as has just been described. Several of the loose shreds of slough were examined, and on them the fungus was not detected; but as far as I could make out, the epithelial covering had been lost from these shreds. The epithelium of the healthy portions of the folds was free from this growth. The substance of the sloughs of the omasum was opaque and very granular; but nothing further than this condition, nothing at least noteworthy, was detected.—J. S. B.

(3.) Cow.—Royal Veterinary College.—Examined October 22, 1865.

The *lips, gums, tongue, palate,* and other parts of the interior of the *mouth,* together with the *fauces* and upper surface of the *soft palate,* were more or less completely covered with an opaque, yellowish, and friable layer, which could readily be detached, leaving the subjacent surface more or less deeply congested. Over the anterior three-fourths of the dorsal surface of the tongue, this deposit resembled ordinary "fur," and was pretty firmly adherent by its under surface, the tissues beneath being natural, or nearly so, in colour; but on the lips, gums, inferior surface of tip and sides of tongue it constituted an imperfect granular layer, which varied in thickness, and in some places had become detached, leaving patches only adherent. The mucous membrane in these latter situations, whether exposed or covered, was found congested. The palate over the greater part of its extent presented the same character, but over both surfaces of the soft palate, and the portion of tongue posterior to the circumvallate papillæ, including the anterior surface of the epiglottis, and the whole of the pharynx, the deposit was very abundant and thick, of an opaque, dirty, yellowish colour, granular on the surface, friable, arranged more or less in ridges or bands, and detachable with great facility from the subjacent mucous membrane, which was everywhere intensely congested—the congestion extending on the tongue to a depth about equal to the thickness of card-board.

The mucous membrane covering the *epiglottis, arytenoid cartilages,* and rest of the *larynx,* was tumid and congested, and covered (especially anterior to the arytenoid cartilages and below them,) with a thin granular lymph-like layer, which could be very readily removed, and was very irregular in its distribution. Besides the general red tinge presented by the laryngeal mucous membrane there were spots and patches of a much deeper red, almost black, colour, which were scattered over the whole surface, but had a tendency to be clustered, and were most abundant on the opposed surfaces of the arytenoid cartilages, on the mucous membrane beneath these bodies, and over the lower angle of the epiglottidean cartilage. These patches were somewhat elevated and granular on the surface; and from some of them hæmorrhage, forming loose slightly-adherent clots, had taken place.

Trachea redder than natural throughout, but presenting arcely any of the usual red streaks and spots. Its whole libre, from one end of the tube to the other, was occupied an accumulation of frothy fluid (much like that which rms on the top of stout); and adhering slightly to the rface were thin patches of what appeared to be yellowish mph.

The mucous membrane of the *bronchi* and larger *bronial tubes* was more deeply congested than that of the achea, and presented numerous more or less clustered ngitudinal streaks of seeming extravasation; and more- er was covered more extensively than that of the trachea, th soft granular exudation. The *smaller bronchial* tubes so presented a great deal of congestion, with abundant emorrhagic spots, the latter being generally most marked ound the margins of their orifices. The tubes generally ntained, in addition to frothy fluid, some dirty pellets mucus and occasionally small clots of blood.

The *lungs* were much congested in places, and in some lematous, but they were crepitant throughout, and pre- nted much interlobular emphysema. The *bronchial glands* re deeply congested. *Pleuræ* healthy.

Pericardum healthy. *Heart* a little flabby, and presenting few extravasations beneath the lining membrane of its left rticle.

Peritoneum healthy. *Liver* pale, but otherwise normal. *leen*, healthy.

Œsophagus healthy.

The *rumen* contained a large quantity of normal food; epithelial surface was very easily removed, but the organ s otherwise healthy.

The *reticulum* was healthy, and in the same condition the rumen.

The *omasum* contained a moderate amount of food, to ich the epithelium adhered. Many of the folds pre- ted large patches of diffused slight congestion, which d a tendency to be most intense in lines. In a few in- nces there were circumscribed circles of intense redness, m half to three-quarters of an inch in diameter, the tres of which were greyish and sloughy, but not yet ken down. At the outside there were not more than a en of these. In one instance four were found on one ; the others existed singly.

The *abomasum* contained a quantity of thin food, and to a great extent healthy. It presented, however, oc- ional patches of slight congestion. From the pylorus wards, for 3 or 4 inches, the mucous membrane was con- rably congested, and in places thickly studded with k red points. Besides this there were slight patches of p congestion, but no tendency to ulceration. The cous membrane was somewhat softened.

Rectum, in the lower part, intensely congested in patches, congestion being apparently due in some instances to norrhage. This appearance became more and more nse towards the outlet, but had nowhere led to ulcera- or exudation.

The *vulva* and *vagina* were also deeply congested, and ented patches of apparent extravasation. The conges- here, however, was not so intense as that in the rectum. re was a little granular exudation about the lips of the a, but no ulceration.

The *kidneys*, *bladder*, *uterus*, *cæcum*, and *small and e intestines* (excepting the rectum), were reserved for re examination, and became lost.

The *flesh* of this animal was perfectly healthy-looking sweet. No emphysema had been observed during life, not being visible in superficial parts, was not specially ed for in the deeper tissues after death. It might or nt not have been present in some of them.—J. S. B.

Mr. Sweetland's Bull, ill four days.—Royal Veterinary College.—Examined October 23d, 1865; died at 7 a.m. same day.

The *palate*, in the greater part of its extent, the insides e *upper and lower lips*, the *gums*, the under part of the f the *tongue*, and the sides and base of this organ, more or less deeply congested, in some parts intensely ested; and their epithelium had become opaque, friable, thick, and had a tendency to become detached. In places this detachment had occurred in small round al patches, in some places very irregularly and exten- ; the gums, indeed, were almost entirely denuded. greater part of the upper surface of the tongue was hy, but it had been severely bitten.

The *fauces*, the *pharynx*, and posterior part of the soft palate were in nearly their whole extent almost black from congestion; the congested surface being somewhat granular, and the epithelium (which was nowhere thick) having become in places detached. The mucous membrane surrounding the exterior of the larynx (in front as well as elsewhere), was somewhat congested and tumid, but very much less so than that of the other parts of the pharynx.

The interior of the *larynx* was throughout intensely congested; the only parts not in this condition being those in which the arytenoid and epiglottidean cartilages were most prominent. The congestion was very deep, almost black, and more or less in patches or spots; but there was neither deposit of lymph nor thickening or separation of epithelium.

The *trachea* too was deeply congested, the congestion being general, but most intense in longitudinal streaks and bands, which had a tendency to be clustered. The congestion occupied the whole circumference, more or less, of the trachea, and the whole thickness of the trachealis muscle.

The *right lung* was congested throughout; the *left lung* was comparatively pale; but both were generally crepitant, and both presented general interlobular emphysema in a very high degree. Here and there, there was a little consolidation of tissue from collapse. The mediastina were all emphysematous to a great extent, and the emphysema extended in great abundance along the trachea and œsophagus into the neck, and down the œsophagus into the abdomen.

The trachea and the bronchial tubes generally contained cylinders of nearly black blood, which were moulded to the tubes in which they lay. The tubes in the lower half of the left lung were alone free from these.

The *bronchial tubes* were generally of a deep red colour, which was due in part to blood-staining, and in part to patches of congestion, like those described in the trachea. The tubes in the lower part of the left lung were pale and contained frothy mucus. *Pleuræ* healthy.

The *pericardium* was healthy, but there were a few petechiæ at the base of the heart and largish sub-serous extravasations about the apex, extending in lines, 2 or 3 inches long, towards the base. The muscular tissue of the *heart* was somewhat flabby; and the cavities were nearly empty, but had probably contained some fluid or semi-fluid blood. There were abundant extravasations of blood in the left ventricle, beneath the endocardium of the papillary muscles, and of the whole circumference of the ventricle, midway between the apex and base. The extravasations extended for a short distance into the subjacent muscular tissue. The lining membrane was smooth. The other cavities were quite healthy.

Peritoneum a little congested, with patches of congestion on the great omentum, but no evidence of inflammation. The cellular tissue at the posterior part of the abdomen (the lumbar region) was extraordinarily emphysematous; and the kidneys were invested in this emphysematous tissue. *Liver* pale and soft, and becoming decomposed. *Gall bladder* full of healthy-looking bile. *Spleen* somewhat small, and a little soft, otherwise healthy.

The portion of *œsophagus* immediately below the pharynx presented a few spots of congestion; but the rest was pale and healthy, except that the epithelial layer became detached in large films.

The *rumen* contained a considerable quantity of healthy food, and some gas. The epithelium was soft and easily detached, but the mucous and other walls of the organ seemed healthy. The *reticulum* was in the same condition.

Omasum of natural size, with healthy contents, and healthy throughout. There was no congestion. The epithelium was scarcely adherent to the mucous membrane, and came away in sheets.

The *abomasum* was also of natural size, and contained very fluid contents. Its mucous membrane (which was somewhat softened), had a general light slate-coloured tint, but beyond this presented no material traces of congestion, even in the situation of the pylorus. There were no patches of redness, and no excoration or ulceration.

The *small intestines* were as nearly as possible healthy. They presented traces only of congestion in parts. *Peyer's patches* were quite natural. The *cæcum* was not congested. The *rectum* was congested in its whole extent, but especially deeply injected, and studded with patches of extravasation, at its lower extremity. There was prolapsus of this part to the extent of two or three inches, and there had been hæmorrhage from it, of which the traces still remained. The remainder of the *large intestine* presented on its mucous surface interrupted longitudinal bands of slight congestion, but no other abnormal condition. *Kidneys* of natural size, pale in their cortical substance, congested

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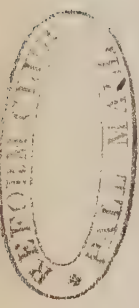
in their medullary, soft, and in a measure decomposed. The *urinary bladder* contained from half a pint to a pint of healthy-coloured urine, and its mucous membrane was healthy and pale.

This bull was a fine animal, and its *muscles* were firm and healthy-looking throughout. The *fat* was also everywhere healthy; but there was general and very considerable emphysema. The superficial cellular tissue in almost every part contained gas, and the muscles were generally separated from one another by gas. This condition was observed in the head and neck, throughout the whole trunk, and in the front and hind legs. It was less abundant, however, in the hind legs than in the front legs, and extended a shorter distance along them. It was very marked in the back, beneath the superficial muscles, and also along the front of the neck, and within the arch formed by the lower jaw bone. The gas was quite odourless, and the tissues in which it was found were quite sweet and free from signs of decomposition. There was a little tendency to decomposition in some of the viscera, especially in the liver and kidneys, and walls of the intestines, but there was no gas in the tissues of any of these organs, nor in any of the serous cavities, nor in the blood vessels.—J. S. B.



(5.) Cow.—Examined October 24th, 1865. Died the same morning.—Royal Veterinary College.

The mucous membrane of the *lips, gums, tongue, palate,* and cavity of *mouth* generally, was almost perfectly healthy; but on the posterior part of the base of the tongue, from the circumvallate papillæ to about halfway between these and the epiglottis, and upon the *pillars of the fauces,* were a good many deep red spots of an irregular stellate shape, in which the epithelium was deficient, and in which the redness was the result of congestion in the mucous tissue beneath. The congestion extended little, if at all, beyond the limits of these spots.

The mucous membrane of the *œsophagus* was healthy.

The mucous membrane of the *larynx* was congested, œdematous, and tumid. The congestion was most intense immediately above the vocal cords and immediately below the arytenoid cartilages. A little granular lymph or altered epithelium adhered to the mucous surface in these situations, together with irregular loose flocculent masses of blood and mucus, mixed. On cutting into the tissues forming the walls of the larynx, most of the laryngeal muscles were found to be black, with what appeared to be extravasated blood.

The *trachea* was congested throughout, the congestion being in the form chiefly of black spots and streaks scattered over the entire surface, but especially accumulated over the region of the trachealis muscle. Clots of blood, mixed with mucus, and apparently with pus, clung to the surface of the trachea. The trachealis muscle was infiltrated in its whole extent and thickness with blood, looking in fact like a black coagulum, traversed with shreds of fibre. The lower part of trachea was somewhat less congested than the upper part, and contained a good deal of frothy fluid.

Pleuræ healthy. *Lungs* a good deal congested, sparely crepitant, and in many places carnified; in the latter situations the sections were dark-coloured and smooth, and the parts retained a good deal of their normal tenacity. There was abundant interlobular emphysema throughout the whole of both lungs. This condition was very marked over the bases of both lungs; where it occupied not merely the interlobular tissue, but large tracts of the sub-pleural tissue as well. It was also very abundant indeed in the spaces near the roots of the lungs, and about the roots. It is worthy too of remark that the emphysema was least pronounced in the non-crepitant parts of the organs. Left lung less congested than right.

The *bronchial tubes* were reddened throughout, especially those of the right lung. The latter contained soft loose cylinders of mixed mucus and blood, to which their reddening was in great measure due; but there were also, scattered throughout, spots of sub-mucous extravasation. The bronchial tubes of the left lung were much paler than those of the right; contained frothy mucus, with little or no blood; but presented a few spots of extravasation.

Pericardium healthy. There were two or three sub-serous extravasations of blood at the base of the heart.

Heart flabby, and its lining membrane blood-stained. The cavities contained a little imperfect coagulum and fluid blood. There were a few extravasations in the musculi papillares and elsewhere beneath the endocardium of the left venticle.

Peritoneum for most part healthy; a few spots of congestion upon the great omentum. *Liver* somewhat smaller than usual, firm, and rather pale. The gall ducts were in many places thickened and loaded with biliary concretions. *Gall bladder* of usual size, and full of thin bile. *Spleen* somewhat small, but soft and a little decomposed; apparently healthy.

The *abomasum* had generally a pale slate colour, and in some parts a faint pinkish tinge. In the neighbourhood of the pyrolus it was mammillated, more deeply congested than elsewhere, and studded with groups of spots of more vivid redness than surrounding parts. There was neither ulceration nor tendency to ulceration. The mucous membrane was little softened.

Omasum rather large, containing a good deal of normal food; uncongested and almost healthy throughout. There were no circumscribed patches of congestion or sloughs. The epithelium came away with great facility.

The *rumen* contained a considerable quantity of natural-looking food. The organ was for the most part healthy, the epithelium coming away with tolerable readiness; but one of the larger muscular bands and two or three of its branches, had a rather deep pink colour, and the epithelium was much more firmly adherent in these situations than elsewhere, indeed could scarcely be removed. On cutting into these bands the pink tinge was found to occupy their whole thickness and to have a mottled appearance.

Reticulum healthy.

Anal orifice healthy; but the *rectum* immediately above was somewhat congested. The rest of the rectum was tolerably healthy.

The *small intestines,* the *cœcum,* and *colon* were not examined.

One of the *kidneys* was congested throughout, but otherwise quite healthy. The other *kidney* was pale in the cortical substance, though studded with a few congested patches congested in the medulla; and soft,—somewhat decomposed.

The *urinary bladder* contained a small quantity of urine. The mucous membrane presented a few congested patches, but was otherwise quite healthy. The *urethra* was deeply congested.

Vagina somewhat congested, but not more so at the lower orifice than elsewhere. At a distance of two or three inches from that orifice there were a few patches of sub-mucous extravasation. *Uterus* and *ovaries* healthy.

The *flesh* and *fat* of this cow were everywhere quite healthy-looking; though decomposition had set in slightly in one or two of the internal organs. No emphysema had been recognized during life; but it was carefully looked for after death, and was found very extensively in the posterior mediastinum, and extending thence around the heart to the anterior mediastinum; very extensively too around the trachea and œsophagus in their whole length. It was thus, abundant in the neck anterior to the spine, from the sternum to the root of the tongue, and also downwards along the œsophagus as far as the diaphragm. A little had extended thence onto the neighbouring portion of the rumen. With this exception the abdominal cavity was quite free from emphysema. There was none whatever in the neighbourhood of the kidneys. Traces of emphysema were discovered in the sub-cutaneous cellular tissue of various parts of the trunk. The blood which was squeezed from the somewhat decomposed spleen was a little frothy, but the blood elsewhere presented no traces of gas.—J. S.

(6.) Cow.—Royal Veterinary College.—Examined 20th October, 1865.—Died evening of October 25th.

The inside of the *lips,* the *gums,* and the anterior half of the *palate,* together with the under surface and sides of the tip of the *tongue,* were decidedly more congested than natural; and the epithelium over these parts was soft and granular, and had become partially removed. The epithelium over the base of the tongue, the *soft palate,* the *pillars of the fauces* was thicker than natural, and not readily removable, but there was scarcely even a blush of congestion or a spot in which the epithelium had been wholly detached.

The mucous membrane of the *larynx* presented a blush of congestion only, and its lower part was covered with a little adherent lymph or thickened and altered epithelium. The *trachea* presented a universal pink tint

which was more intense in some places than others; and on the anterior aspect of the tube, for about two inches below the larynx, the usual streaky deep congestion was very well marked; but it scarcely existed in any other parts of the tube. The muscles of the larynx and the trachealis muscle were pale and healthy. The lower part of the trachea and the bronchi were full of frothy fluid, very like the froth of stout.

The *lungs* were crepitant throughout, not congested, but slightly œdematous in parts. Both organs presented throughout an extreme degree of interlobular emphysema. The emphysema had extended from the lungs into the posterior mediastinum, thence into the cellular tissue of the other mediastina, and both upwards and downwards along the trachea and œsophagus; in all of which situations it was very abundant. The *bronchial tubes* were pale, and contained only a little frothy mucus. *Pleuræ* healthy.

Pericardium healthy. The *heart* was contracted, firm, and altogether healthy-looking, with the exception that there were a few spots of extravasation on the musculi papillares of the left ventricle. The cavities were empty.

Peritoneum healthy. *Liver* of natural size and colour and consistence. *Gall bladder* full of healthy bile. *Spleen* of natural size, and apparently quite healthy. The epithelium about the upper half of the *œsophagus* was granular and thickened, but there was no congestion. The lower half of this tube was healthy.

The *omasum* was healthy in the greater part of its extent, and the epithelium adhered somewhat firmly to its folds. About six of these folds were affected, and presented each one or two rings of deep congestion surrounding a greyish-coloured disc. The diameter of these varied from 1 to 1½ inch, and one or two involved the free edge.

The *abomasum* was somewhat congested throughout, and its mucous membrane was rather soft. There were a few patches of congestion near the pylorus, and two or three small round circumscribed sloughs of mucous membrane; contents healthy.

Rumen and *reticulum* quite healthy; also contents.

The *small intestines* presented some patches of congestion here and there, but were otherwise healthy. *Cæcum* congested, especially at its blind extremity; otherwise healthy. The *large intestine*, especially the *ascending colon*, presented numerous congested longitudinal bands, but no other indications of disease. *Anus* and mucous membrane of *rectum* immediately above it healthy. At about 3 or 4 inches from the anus and thence upwards the prominent folds were congested.

Vulva somewhat congested. *Vagina* healthy. *Uterus* healthy. *Kidneys* somewhat congested, but on the whole healthy. *Bladder* contracted, healthy.

The *flesh* of this cow was quite healthy in appearance; there was no general emphysema; but emphysema was observed in the axillæ, in the neck, and in the situations mentioned particularly in the report.—J. S. B.

(7.) Cow.—Royal Veterinary College.—Died during the night, and examined October 26th, 1865, 2 p.m.

The insides of the *lips*, and the *gums* were deeply congested, and the epithelium had separated to a considerable extent; the under surface of the tip of the *tongue* was also congested, and the epithelium, which formed a yellowish friable granular layer, was in many places considerably thickened, and in irregular patches and tracts detached. The sides and greater part of the dorsum of the tongue appeared to be healthy. But the posterior third of the dorsum was congested throughout; the epithelium was thickened and granular, easily separable, and in many parts entirely detached. The mucous surface beneath was generally congested, in some places very deeply congested, and even slightly bleeding. The *palate* was affected in a similar way in nearly its whole extent, the epithelium, however, coming away in roundish spots. The *pharynx* generally and the *soft palate* were similarly affected; but the disease was altogether most advanced about the *pillars of the fauces*. The mucous membrane of the upper part of the *œsophagus* was studded with patches of granular opaque exudation.

The mucous membrane of the *larynx* was deeply congested, somewhat œdematous, and swollen. The congestion was very intense in numerous spots, studding the lower part of the aryteno-epiglottidean folds, and in still larger spots corresponding to the lateral and posterior parts of the arytenoid cartilages. These spots were elevated and granular, and had hæmorrhage had taken place from some of them. The greater part of the lining membrane of the larynx was covered with a tolerably thick but slightly adherent layer, consisting apparently of lymph mixed slightly with alimentary materials and bronchial exudation.

The mucous membrane of the *trachea* was unnaturally red throughout, and was studded, principally behind and laterally, and more at the upper than the lower part, with longitudinal streaks and spots of deep congestion or extravasation. It was lined throughout with a similar deposit to that observed in the larynx.

Several of the laryngeal muscles were black with extravasation, and the trachealis muscle in its whole extent and thickness was softened and infiltrated with blood.

The *bronchial* tubes were redder than natural, but their redness seemed due to mere blood-staining. They contained a moderate quantity of thin serous fluid. The *lungs*, and more particularly the left lung, were somewhat congested throughout, but crepitant. There was a little interlobular emphysema in the apices only. The upper lobe of the right lung contained a cyst about the size of a duck's egg, containing a colourless glairy fluid. There were no hydatids. The left *pleura* presented a little recent lymph at its lower part, but was otherwise healthy. The *right* was healthy. The *pericardium* was firmly adherent at the apex and was covered in the rest of its extent by a thick layer of recently deposited lymph, which formed numerous bands between the opposed surfaces. The interstices contained about half a pint of serum. Both the parietal and visceral layers of the pericardium presented abundant sub-serous extravasations. The muscular tissue of the *heart* was pale and flabby. There were no extravasations beneath the endocardium. The cavities were empty.

The vessels of the great omentum were full of dark blood, but the *peritoneum* was otherwise healthy. *Liver* rather pale and containing numerous spots of cavernous tissue and a few fibrinous knots. *Gall bladder* full of healthy bile. *Spleen* of usual size, extremely pulpy. The *œsophagus* was healthy, except in the part previously described.

The *omasum* was large and contained normal food. The epithelium came away with great facility, and the folds were pale and generally healthy, two only being diseased. One of them presented a single spot, the other four spots. These were round (varying from a quarter of an inch to one inch in diameter), were deeply congested, and in some parts yellowish and sloughy-looking. The latter parts tended to occupy the centre of these patches, but the two conditions were more or less irregularly intermixed.

About a foot from the pylorus the *abomasum* presented a few circumscribed, deeply congested patches, the congestion having a spotted appearance. The lower three or four inches of this stomach again were rather thickly studded with patches of congestion. These consisted primarily of deep red elevated spots (apparently due to extravasation). Some of these spots were arranged "discretely," others formed dense clusters. These clusters were irregular in size and shape, and ran more less into one another. Some of them presented a little yellowish discolouration, possibly from commencing gangrene; but there was nowhere any actual breach of surface. The rest of the abomasum was tolerably healthy, and its contents were normal.

The *rumen* and *reticulum* were healthy, except that their epithelium came away with unusual readiness. Their contents were normal. The *anus* was scarcely, if at all, reddened. The *rectum* was rather deeply congested, especially the prominent folds of mucous membrane; and immediately above the anus was a longitudinal fissure or ulcer about two inches long. The *kidneys* were healthy, but soft from decomposition.

The mucous membrane of the *vulva* was deeply congested, and was studded with what seemed to be patches of adherent lymph. The lower part of *vagina* was also congested, but the remainder of the tube was tolerably natural. The *urinary* bladder, which was healthy, contained a large quantity of urine, and presented a single patch of congestion.

This cow was examined some hours (10 or 12 perhaps) after death, and decomposition had occurred to some extent in many of the internal organs, and also to a slight extent in the *muscular tissue*. There was, however, no emphysema in any part of the body except the apices of the lungs.—J. S. B.

(8.) Calf.—Royal Veterinary College.—Examined October 31st, 1865.

The upper surface of the *tongue* was studded with small opaque yellowish spots, in which the epithelium appeared to have become opaque and thickened, and at the centre often detached. The subjacent mucous surface was congested,

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the congestion corresponding accurately to the spots. The under surface and sides of the tip of the tongue were covered with tracts of thickened, soft, and granular epithelium, which was becoming detached, the corresponding mucous membrane being congested.

The same condition existed, but in an aggravated degree, at the more posterior part of the tongue, between the circumvallate papillæ and the epiglottis, on the *pillars of the fauces*, the *soft palate*, *the pharynx*, and the first inch or two of the *œsophagus*.

The interior of the *larynx* was perhaps generally a little more congested than natural; and both above and below the vocal cords there were distinct layers of soft, slightly adherent lymph. The *trachea* was full of frothy mucus (like froth of stout). This tube was somewhat congested in its lower half, but not apparently inflamed. The *larger bronchia* were, perhaps, somewhat more congested than the trachea itself.

Pleuræ healthy. *Lungs* very sparely crepitant, thickly studded throughout with patches of consolidation, some of which were pale and fleshy looking, others darker and friable, approaching in character to pulmonary apoplexy.

These consolidated portions were not soft, and were separated from one another by a net-work of crepitant tissue. There was little, if any, interlobular emphysema.

The *bronchial* tubes were not materially congested, and contained a little frothy mucus only.

Pericardium healthy. *Heart* rather flabby, otherwise healthy.

Peritoneum healthy. *Liver* perfectly healthy. *Spleen* healthy. The upper part of the *œsophagus* presented a few patches of granular exudation, but the lower part was healthy.

Rumen and *reticulum* healthy.

The epithelium of the *omasum* was perfectly adherent throughout; a few of the folds presented a little diffused redness, but otherwise the organ was healthy.

There was a blush of redness over the greater part of the *abomasum*, but there was no other abnormal appearance whatever.

The *small intestines* were healthy, except that there were two or three tracts of marked congestion. *Peyer's glands* were healthy.

The mucous membrane of the *large intestine* presented a few patches and longitudinal streaks of congestion, but was generally healthy.

The *cœcum* was pale and perfectly healthy. *Anus* and *rectum* healthy.

The lower part of the *vagina* was a little congested, and the epithelium, at the lower orifice, somewhat granular. *Uterus*, &c., healthy.

Kidneys healthy *Urinary bladder* healthy,

There was no general emphysema, and the *flesh* of the calf was healthy.—J. S. B.

(9.) Bull.—Royal Veterinary College.—Examined October 31st, 1865.

The edges of the *tip of the tongue* were covered with soft granular epithelium. The sides and upper surface of the root of the tongue, the *pillars of the fauces*, the *soft palate*, and the *pharynx* were deeply congested, and studded somewhat irregularly with patches of opaque thickened and soft epithelium; this was most abundant on the pillars of the fauces. The epithelium of the *roof of the mouth* and of the *lips and gums* was generally in the same condition.

The *larynx and trachea* were almost black with congestion and extravasation. The congestion in the former being nearly uniform; in the latter having the form of abundant close-set longitudinal streaks.

In the neighbourhood of the rima glottidis was a soft, loose, rusty-coloured clot, about as large as a walnut; and the surface of the larynx and that of the trachea were covered with a soft pulpy layer, which varied in thickness and in colour from that of partially decolourized (brick red) blood to a dirty buff. This was very slightly adherent to the subjacent mucous membrane, and came away in irregular flakes and masses.

The more congested parts of the mucous membrane, both in the larynx and in the trachea, were thickend and granular. The *trachealis muscle* was infiltrated with blood in the greatest part of its extent, and the muscles of the larynx were partly infiltrated in the same way.

The *lungs* appeared to be crepitant, but congested throughout. They were too much decomposed, however, to render their examination satisfactory, or to ascertain if there was any interlobular emphysema. If there was any emphysema, it must have been slight and partial.

Pleuræ and *pericardium* healthy.

The *heart* was very flabby and soft. The cavities contained black coagula, these being least abundant in the left ventricle. There were no sub-endocardial extravasations.

Peritoneum healthy. *Œsophagus, rumen,* and *reticulum* healthy.

The *omasum* and *abomasum* were both entirely free from congestion, and healthy.

Lower part of *rectum* deeply congested, but *anus* healthy.

The rest of the *large intestine*, including the *cæcum*, was healthy, excepting only an occasional patch of not intense congestion. There were one or two patches of congestion in the *small intestines*, but they also were otherwise healthy. *Peyer's patches* were sound.

Liver and *spleen* decomposed, but apparently healthy *Gall bladder* full of normal bile. *Kidneys* also healthy but decomposed. *Urinary bladder*, full of urine, healthy.

The *viscera* of this animal were undergoing rapid decomposition; the *flesh*, however, was in pretty fair condition, and there was no general emphysema. There was a tolerable amount of emphysema, however, about the roots of the lungs, and generally in the posterior mediastinum.—J. S. B.

(10.) Cow.—Royal Veterinary College.—Opened and examined November 1st, 1865, at 2 p.m.

There were a few aphtha-like excoriations on the *gums* and the inside of the *lips*.

The greater part of the *cavity of the mouth*, including the *tongue* and *palate*, was as near as possible healthy; but the back of the *tongue*, *fauces*, and *pharynx* generally were congested, and studded with patches of opaque epithelium which had become removed in places.

The mucous membrane of the *larynx* was rather deeply congested, and presented patches of what looked like adherent lymph. There was, however, no marked submucous extravasation, except in that part of it below the arytenoid cartilages and vocal cords. In this latter situation the condition of things exactly resembled that (afterwards to be described) in the trachea.

The *trachea* was lined partly with lymph, partly with small clots (which had exuded from innumerable points) and contained also small fragments of hay; this mixture of blood, lymph, and food was with difficulty washed away from the surface, to which it was evidently adherent. The mucous lining of the trachea was congested throughout and studded very thickly with spots and streaks of submucous extravasation. These were most abundant laterally and behind, where the surface was rendered almost black in consequence. The *trachealis muscle* in almost its whole extent, and portions of the muscles of the larynx, were infiltrated with blood.

The *right lung* was to a considerable extent attached to the ribs by old adhesions; and a portion of the lung was consolidated, but not from recent pneumonia. The lungs were congested, but crepitant, and presented a good deal of interlobular emphysema. They were much decomposed.

The *bronchial tubes*, especially the larger ones, were congested and studded with extravasations, and their contents were very much like those of the trachea itself. There was some emphysema about the posterior mediastinum.

Pericardium healthy. *Heart* pale and flabby from decomposition; the cavities containing large dark-coloured clots; no extravasations beneath the lining membrane of the left ventricle. The *aorta* and many *other vessels* contained cylinders of coloured clot.

Peritoneum healthy. There was a good deal of emphysema in the lumbar region, about the kidneys.

Liver, spleen, and kidneys greatly decomposed, but not apparently unhealthy. *Gall bladder* full of healthy bile.

The *œsophagus* was healthy, but contained in its whole length regurgitated food; a large pellet of this obstructed the superior orifice of the larynx.

The folds of the *omasum* presented in some instances diffused congestion, and their epithelium was exceedingly soft and separable; otherwise the organ seemed healthy.

The *abomasum* presented some patches of diffused redness and here and there groups of more deeply congested spots, but the congestion was nowhere very marked, and there were scarcely any near the pyloric orifice.

Rumen and reticulum healthy. Lower part of *rectum* deeply congested, otherwise healthy. *Anus* healthy. *Cæcum* somewhat congested.

The lower part of the *vagina* was deeply congested, and mediately within the lips of the *vulva* there was a little bmucous extravasation; the epithelium at the outer rgin was a little granular and opaque. *Uterus* healthy. *Bladder* healthy; full of urine.
Udder much congested.
In this cow decomposition was taking place very rapidly, d interfered with the value of appearances observed in ny organs. The *flesh*, however, was not unhealthy-oking; and there was no general emphysema.
The *conjunctivæ* were congested.—J. S. B.

!.) Cow.—Royal Veterinary College.—Opened October 31st, 1865; organs examined November 1st.

The inside of the *lips* and the *gums* presented numerous egular stellate spots, from which the epithelium had appeared, and corresponding to which the mucous embrane was congested. These were most marked around e margins of the incisor teeth; a few similar patches were served upon the anterior part of the *palate*. The epithe-m of the under surface of the tip of the *tongue* was softened, ck, and granular. The back of the tongue, *soft palate*, *lars of fauces*, and *pharynx* were all deeply congested, and re covered with extensive patches of thickened opaque nular epithelium, which had here and there, and espe-lly at the base of the tongue, become detached; the con-tion extended somewhat deeply into the tissue of the ngue.
The *larynx and trachea* were almost black with congestion ate XVII.) and submucous hæmorrhage, the congestion ng nearly uniform; still, however, presenting on close pection the streaky character ordinarily observed in these es. The interior of the larynx presented at its lower part ttle adherent lymph; and the trachea was occupied in its ole length by extravasated blood, portions of which, ced with mucus and apparently with lymph also, formed irregular layer lining the tube and adherent to its sur-e. The *trachealis muscle* was throughout infiltrated with od, and portions of the *laryngeal muscles* were similarly cted.
The *lungs* were deeply congested, and far advanced in omposition. There appeared to be a little interlobular hysema; but this might have been the result of decom-ition. The *heart* was very soft and decomposed, and tained a little decomposing blood.
ts lining membrane was blood-stained, but presented no avasations.
Pleuræ and *pericardium* healthy.
Peritoneum healthy. *Liver, spleen, and kidneys* soft from omposition, but apparently healthy. *Œsophagus* healthy.
The other abdominal viscera were not examined.
This cow was much decomposed, but the *muscular tissue* not seem unhealthy. There was no general emphysema.
organs were removed in my absence, but I was informed the man who removed them, that he observed some hysema in the neck.—J. S. B.

) Cow.—Royal Veterinary College.—Opened October 31st, 1865.—Organs examined November 1st.

The *gums* and inside of the *lower lip* were a good deal gested, the epithelium was almost entirely removed, the ments remaining being opaque and granular. On the *of the mouth* the epithelium had become detached in erous rounded spots, the mucous membrane beneath g congested. There was some congestion about the of the *tongue* and *fauces*, and especially about the *soft te*; and in these regions the epithelium was in some s slightly granular and in some parts had become ched. The situations in which these changes were t marked were the portion of tongue immediately behind circumvallate papillæ, and the pillars of the fauces.
he *larynx* was congested throughout, and especially so ath the *arytenoid cartilages*; in which latter situation e was a good deal of soft dirty yellow secretion (appa-y lymph) slightly adherent. A little of the same kind aterial was found forming a very thin layer upon the ax above the *vocal cords*. The *trachea* was preter-rally red or rosy in its whole extent, especially below; was studded throughout with numerous reddish black ested points and streaks from the surface of one or two hich slight hæmorrhage had taken place. The cavity he tube was occupied in its whole length by a large q tity of thick frothy fluid. The *trachealis muscle* and *les of the larynx* were free from hæmorrhage.
he *lungs* were congested and somewhat sparely crepitant throughout; and both of them contained a considerable number of tumours (varying from the size of a horse bean to that of a hen's egg) which appeared to me to be cancerous. There were slight traces of interlobular emphysema. The bronchial tubes were somewhat congested and contained a quantity of frothy mucus.
Pleuræ (except where adherent over some of the above-mentioned growths) and *pericardium* healthy.
Heart flabby from decomposition; the cavities contained decomposing clots (*i.e.* clots with bubbles of gas). The lining membrane of the left ventricle and its papillary muscles were studded pretty thickly with extravasations.
Peritoneum healthy. *Liver* healthy. *Gall bladder* full of healthy bile. *Spleen and kidneys* healthy.
Some of the folds of the *omasum* presented a diffused redness; and one of them, three circular perforations from three-quarters to a quarter of an inch in diameter. The margins of these were rounded and smooth but without thickening or congestion. A neighbouring fold presented a single perforation about a line in diameter. These perforations were evidently not the results of post-mortem violence, but had doubtless been produced either by ulceration or the separation of a slough, and the edges had become perfectly cicatrized and healthy. The omasum was otherwise healthy.
The *abomasum* was generally healthy and only very slightly congested towards the pylorus. *Œsophagus* healthy.
The *rumen* and *small and large intestines* and *uterine organs* were not examined.
Decomposition was taking place here rapidly, and had impaired the condition of many organs, but the *flesh* was generally not unhealthy, and there was no general emphysema. The organs were removed from the body in my absence, but I was told by the man who removed them that there was some emphysema in the lumbar region, about the kidneys.—J. S. B.

(13.) Cow.—Royal Veterinary College.—Examined November 5th, 1865.

The inner side of the *lower lip* and the corresponding *gum* were congested, and the epithelium had come away in parts. The fungiform papillæ of the *tongue* were unusually distinct; many of the circumvallate papillæ were congested and covered with thickened soft epithelium or lymph; the portion of *tongue* behind them, and in a less degree the *soft palate*, the *pillars of the fauces*, and the *pharynx*, were congested and studded with thickened yellow buff coloured lymph or epithelium. The parts were not denuded.
The *larynx* was generally congested, but not very deeply, and was lined above the vocal cords with an exceedingly thin film of lymph, and below this with a layer of what looked more like thick mucus. The lining membrane of the upper half of the *trachea* was reddened, but there was no sub-mucous hæmorrhage. From the middle of the trachea downwards the congestion increased and became very deep towards the lower part, especially along the *trachealis muscle*. The lower part of this muscle if not infiltrated with blood was at least infiltrated with blood-stained serum. The lower part of the trachea contained a good deal of frothy mucus.
The *lungs* were considerably congested, and in a great part of their extent carnified. But there was no pneumonia and no interlobular emphysema. The *bronchial tubes* were somewhat congested and contained frothy fluid.
Pleuræ healthy. *Pericardium* healthy.
The *heart* was somewhat flabby, the ventricles nearly empty, the auricles containing clots. Beneath the lining membrane of the left ventricle were numerous extravasations of blood.
Peritoneum generally congested, but not presenting effusion of serum or lymph, or any other positive evidence of inflammation. The outer surface of the small intestines was deeply congested throughout. *Liver* somewhat pale but healthy. *Gall bladder* small, containing only a little thickish yellow bile. *Spleen* somewhat soft, otherwise healthy. (Plate X.)
The folds of the *omasum* presented a considerable number of patches of disease; in some cases several of these were on one fold, in other cases they occurred singly; sometimes they occupied the central portion of the folds, but were frequently found on the free edge. Those of medium size were, according to their position, round or semi-circular. The larger ones were a square inch or two in area: the smaller involved one or two papillæ only. The margins of these patches were always abrupt and deeply congested, and in those cases where the disease involved a papillæ or two only, congestion alone was present. But in other cases the central portions had almost invariably assumed a dirty

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olive-brown tint, mingled with remnants of congestion. Some of the minuter patches were limited to the papillæ of one surface of a fold, and even some of the larger patches were more distinct on one side than the other. The epithelium adhered more firmly to these patches than to the surrounding parts. Two or three of the folds presented circular orifices about a line in diameter with perfectly pale unthickened margins. The larger vessels in the folds of the omasum contained more blood than usual.

The *abomasum* was deeply and nearly uniformly congested in its upper three-fourths; and this congested portion was studded pretty thickly throughout with small points of a deep claret colour. The remainder of the abomasum was but slightly congested, but it presented numerous shallow depressions of irregular shape and varying from one-third of an inch in diameter downwards, in which the mucous membrane appeared to have been removed and cicatrized. The central depressed portions of these patches were mostly quite smooth, but to one or two shreds of tissue (sloughs?) adhered very slightly. The mucous membrane forming their margins was in some cases distinctly, though slightly, plicated.

The *rumen* was generally more congested than natural, and its smoother portion presented a very large irregular tract of a port-wine hue. The edges of the tract were somewhat sinuous, and their vicinity was studded with spots of the same character, well-defined, differing in size, and running more or less into one another. Some of them had begun to assume a somewhat livid hue. There was no ulceration and no sloughing, nor any thickening of the mucous membrane. The rest of the rumen presented also numerous large tracts, in which the mucous membrane and its papillæ were somewhat deeply congested, and the latter swollen, but there was no evidence yet of sloughing. The epithelium was detached with great facility, but was somewhat more adherent to the congested patches than to other parts.

Reticulum and *œsophagus* healthy.

The contents of the first three stomachs were healthy. Those of the abomasum were bloody.

The *small intestines*, from one end to the other, were full of a kind of dark bloody mucus, which was very adherent to the surface. The mucous membrane was of a uniform dark red colour, and exceedingly pulpy. Both it and the submucous and muscular coats were deeply congested, the ramifications of the minute vessels being very distinct. There was, however, no visible inflammatory exudation or infiltration, and no disease in *Peyer's patches*. The half of the *cæcum*, nearest the commencement of the colon, was deeply congested, especially the lips of the ileo-cœcal orifice. The *ascending colon* was deeply congested; but the rest of the large intestine, except the lower part of the rectum (which has to be described), presented only a moderate degree of congestion. The *large intestines* contained no blood. The *anus* was congested, and there was general congestion for three or four inches of the lower part of the *rectum*; from this point upwards there was still congestion, but it was patchy and occupied principally the prominences of the longitudinal folds.

The margins of the *vulva* were deeply congested, and the epithelium was thick, white, and flaky; the congestion was continued up the *vagina* for three or four inches, but from that point upwards the tube was healthy. *Uterus and urinary bladder* healthy. *Kidneys* healthy.

There was no general emphysema, and none in the mediastinum or about the kidneys. The *flesh* of the animal was healthy-looking.

Microscopic examination.—The epithelium of the congested portions of the mouth was examined microscopically; and it was observed that the granular and pulpy superficial portions consisted of epithelial scales only, while the deeper and more consistent layer was made up in great measure of what seemed to be nuclei, and exactly resembled those of the epithelial scales. They were not acted on by acetic acid like pus corpuscles.

The papillæ of the diseased patches of the omasum were examined, and in every case, even where the disease was limited to a single papilla, the epithelium covering them was found to be the seat of a pretty abundant growth of a low form of vegetable fungus, this consisting of branching tubes of various diameters, with a tendency to dilatation (production of spores) at the apices. The epithelium of the healthy part of the mucous membrane was free from these.

The congested pulpy mucous membrane of the small intestines was seen to contain abundant blood-distended capillary and other small vessels.

A portion of the rectus abdominis was examined and the transverse striæ were seen to be perfectly distinct.—J. S. B.

(14.) HEIFER.—Royal Veterinary College.—Examined November 8th, 1865.

The inside of the *lips*, the *gums*, the *roof of the mouth* and the sides and under surface of the tip of the *tongue* were deeply congested and covered with granular epithelium which in many places had become removed. The same condition existed, only in a much more advanced degree, the posterior half of the *tongue, soft palate, pillars of the fauces* and *pharynx*. In this latter situation the epithelium was opaque and flaky and thick, and had become separated in many parts; and upon the sides of the pharynx there were, in addition, small, round, elevated patches of very intense congestion or submucous hæmorrhage.

The lining membrane of the *larynx* was generally congested, but presented, irregularly scattered over its whole surface, deep red circumscribed elevated congested spots. A little lymph or thickened epithelium covered the mucous membrane of the larynx, especially that of the vocal cords. (That was the impression conveyed by the appearance at the moment of making the post-mortem examination; but a more careful subsequent examination showed that the seeming patch of lymph, covering each vocal cord was simply the mucous membrane, which in a well-defined and nearly circular area, had become of an ashy colour, and was evidently in a very early stage of sloughing. The two parts thus affected accurately corresponded to one another in shape, and had evidently in life been applied closely upon the other. In fact it seemed probable that the necrosis of the parts had been determined by pressure.) To some of the congested points small clots of blood were loosely attached. The *trachea* was abnormally pink throughout and was studded, though not very thickly, with streaks and spots of submucous extravasation; these were most abundant at the lower part of the tube, where they were somewhat clustered. They were also abundant in the *bronchi*. The trachea and bronchi contained a large quantity of frothy mucus. The *trachealis muscle*, in its whole extent was infiltrated with blood.

Lungs somewhat congested, but generally crepitant and not unhealthy. The *bronchial tubes* were congested, and studded to some extent with spots of submucous extravasation, and contained frothy sanguinolent fluid. There was little interlobular emphysema at the apex of the left lung. *Pleuræ* healthy.

Pericardium healthy. *Heart* flabby and soft, presenting in its left ventricle abundant sub-endocardial extravasation. At the base of the heart, externally, there were a good many petechial spots. Cavities nearly empty.

Peritoneum somewhat congested, especially on the surface of the small intestines.

The folds of the *omasum* were generally more congested than natural, the congestion assuming partly a diffuse character and partly a linear arrangement. There were moreover, a good many circumscribed congested spots about a quarter of an inch in diameter. These appeared simply congested and not to have undergone any further changes; that is to say, there was neither thickening nor tendency to gangrene.

The *abomasum* was generally and deeply congested, both upon its folds and towards its lower extremity presented numerous groups of small claret-coloured spots.

The *rumen* presented large tracts of congestion, but no distinct spots of more advanced disease; the epithelium came away very readily. *Reticulum* healthy. The upper part of the *œsophagus* was congested and studded with a granular deposit; the lower part was healthy.

The upper part of the *small intestines* presented numerous black points which were probably the remains of congestion. The *ileum*, in nearly its whole extent, was intensely congested; its mucous membrane was reduced to a pulp and the contents of this part were blood-stained, if not actually mixed with blood. The *cæcum* was also deeply congested together with the commencement of the *large intestine*. The greater part of the *colon*, however, was healthy, together with the upper part of the rectum. The lower part of the *rectum* was deeply congested, and presented a few sub-mucous extravasations.

Liver, spleen, kidneys, and *bladder* healthy.

The *vulva* and lower part of the *vagina* were deeply congested, and presented a few sub-mucous extravasations of blood. The upper part of the *vagina* and the *uterus* were healthy.

The *flesh* of this heifer was healthy, and there was no general emphysema.

Microscopical examination.—On examining the thickened epithelium at the back of the mouth, it was found to consist chiefly of normal epithelial scales, many scales which were granular, many mucous corpuscles (nuclei of epithelial cells?), crystals resembling those of triple phosphate, and matter probably of extraneous origin. It seemed to

nat the deeper and more adherent portions of the epithelial yer contained the mucous corpuscles in greatest abundance. he congestion of the tissue beneath was entirely confined over-loading of the minute vessels.

The congested trachea was examined, and it was distinctly ascertained that the small vessels were distended ith red blood, and generally remarkably visible, but also at there were abundant spots of extravasated blood, many which were entirely microscopic. In these latter cases e spots of extravasation formed round or oval accumulaons of blood corpuscles, concentrated in the centre, and adually fading off at the edges.

The muscular tissue of the heart was much more granular an that of the voluntary muscles; much as it is seen to in human beings, in many forms of disease, unattended th actual heart disease. The sub-endocardial extravasaon was found to involve the muscular tissue to some tle depth; but the effused blood merely occupied the terstices of the muscular fibres; the latter were not more anular than those of the rest of the heart's walls.

The blood corpuscles seemed perfectly natural.

The mucous membrane of the abomasum was seen to be tensely injected—the capillary and other vessels, full of ood corpuscles, being almost as distinct as if injected th vermilion. The claret-coloured spots seemed to be ly more intense spots of congestion; at least I did not cognize any extravasation.—J. S. B.

(15.) Heifer.—Royal Veterinary College.—Examined November 8th, 1865.

The inside of the *lips* and the under part of the tip the *tongue* were congested and covered with granular ithelium, which had become separated in places. The ot of the *tongue*, the *soft palate, the pillars of the fauces*, *pharynx*, and upper two or three inches of the *œsophus* were congested, covered with opaque, flaky, separable ithelium, which in some parts was thickened, in others d been removed. These parts were all deeply congested. The *larynx* and *trachea* were both of them generally ngested, but presented no extravasations. The *tracalis muscle* was healthy.

The *bronchial tubes* were much more deeply congested an the trachea, and presented abundant spots of subcous extravasation. The air passages contained a good al of frothy fluid. The left *lung* was somewhat conted; but both *lungs* were generally crepitant and otherse healthy.

Pleuræ healthy, *pericardium* healthy. The *heart* was nerally healthy, but there were a few extravasations neath the lining membrane of the left ventricle. The ities contained but little blood.

Peritoneum generally healthy, but that covering the all intestines was somewhat congested.

The greater part of the *abomasum* was scarcely congested; in the lower third the congestion was deeper than ewhere, and there were two or three circular depressed ches from which the superficial layer of mucous membe appeared to have separated. In one, within an inch the pylorus, the muscular coat was exposed. This was l, about one-third of an inch long, and presented well rked bevilled (funnel-like) edges.

The *rumen* presented several large tracts of congestion, l the epithelium came away readily, but there was no er evidence of disease. *Reticulum* healthy.

The folds of the *omasum* presented in some cases diffused ness, in other cases they were pale, but there was no inct evidence of disease.

The lower part of the *rectum* was congested, but the rest the *large intestine* and the *cœcum* were pale and healthy.

The lower part of the *small intestine* presented numerous ts of intense congestion. The upper part was healthy.

The *liver, spleen,* and *kidneys* were all healthy, but haps a little softer than natural. *Œsophagus* healthy.

The lower part of the *vagina* was congested; the upper and the uterus were healthy. *Bladder* healthy.

The *flesh* of this heifer was healthy, and there was no eral emphysema.—J. S. B.

(16.) Heifer.—Royal Veterinary College.—Examined November 8th, 1865.

The *gums* and *lips* were congested and imperfectly covered a thickened epithelium; the under service of the tip of *tongue* presented traces of the same condition; the *roof the mouth* was covered with thick yellow and almost by epithelium, which could be scraped away with ease, ing the parts beneath intensely congested. The base of tongue, the *fauces*, and the *pharynx* were also congested, studded with flakes of thickened epithelium and uded spots.

There was generally slight congestion of the *larynx*, but the disease here was slight.

The upper three-fourths of the *trachea* were pink, but as nearly as possible healthy; in the lower quarter there were a few spots and streaks of sub-mucous extravasation, and the trachealis muscle in this situation was black from infiltration with blood. Traces of this latter condition were observed higher up in the trachea.

The *bronchial tubes* of the left lung seemed as nearly as possible healthy, but those of the right were studded pretty thickly with points of extravasation. The tubes contained frothy fluid mixed to some extent with blood.

The *lungs*, and more especially the right, were congested, but generally crepitant. Both presented a little interlobular emphysema, and there was a little about the root of the lungs. *Pleuræ* healthy, *pericardium* healthy. *Heart* healthy, but presenting one or two petechial spots on the musculi papillares of the left ventricle.

Peritoneum healthy. *Œsophagus, rumen, and reticulum* healthy. The folds of the *omasum* presented a good deal of diffused congestion, but no further change. The *abomasum* was deeply congested throughout; the folds of mucous membrane, and again the portion of it near the pylorus, were dotted thickly with deep claret-coloured points; and in the latter situation there was certainly one spot in which a small slough was separating from surrounding parts.

The *small intestines* presented generally a good deal of congestion; this was very intense in the *ileum*, and occupied there long tracts of mucous membrane. There were two or three points from which slight hæmorrhage seemed to have taken place. But the general contents were milky.

The mucous membrane of the *cœcum* was studded with small patches of congestion. At the commencement of the *colon* the congestion assumed a linear arrangement, and this condition was continued in a slight degree throughout the remainder of this tube.

The *rectum* from the *anus* upwards was very deeply congested; below, this condition was general; above, it was chiefly visible along the prominences of the longitudinal folds.

Liver, kidneys, and *spleen* healthy. The margins of the *vulva* were somewhat congested, and presented a few sub-mucous extravasations. The lower part of the *vagina* was also congested. The *bladder* was empty, and its lining membrane somewhat congested.

The *flesh* of this cow was healthy-looking, and there was no emphysema.

Microscopical Examination.—Under the microscope, the opaque sloughy material adhering to a point in the abomasum presented the ordinary character of mucous membrane, with the exception that it was very granular and opaque, and studded with bodies like compound granule cells.—J. S. B.

(17.) Calf.—Royal Veterinary College.—Examined November 9th, 1865.

The *gums, lips,* and greater part of the *cavity of the mouth* seemed healthy, but at the root of the *tongue* and about the *pillars of the fauces* there was a granular thickened flaky condition of epithelium. The posterior half of the *palate* presented numerous small round or oval spots from which the epithelium had been detached; and where the subjacent mucous membrane was exposed. The latter was slightly congested in these situations. In the same neighbourhood the surface was studded with numerous transparent beads about the size of a pin's head; these looked like vesicles, but were really only drops of mucus protruding from the orifices of mucous glands.

Larynx and trachea of a uniform pinkish colour (but not particularly congested) and containing a large quantity of frothy mucus.

The *lungs* were for the most part pale, but studded here and there with patches of carnification and collapse. The right lung seemed more congested than the left. They were generally crepitant.

The *bronchial* tubes were somewhat congested and contained a good deal of watery mucus.

Pleuræ and *pericardium* healthy.

Heart healthy throughout; free from petechiæ.

Peritoneum healthy; *œsophagus* healthy.

Rumen and reticulum healthy.

Omasum perfectly healthy.

Abomasum somewhat congested generally, but especially congested in its upper two-thirds.

The lower part of the *rectum* was congested, and especially so close to the *anus*.

The *cœcum* presented two or three patches of congestion, and part of the *ascending colon* was also congested; but in other respects the *large intestines* were healthy.

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The lower part of the *small intestine* for the length of some yards presented on its mucous surface a dark slate-coloured tint apparently due to congestion; the remainder of the intestine was healthy.

The contents throughout consisted of a clay-coloured gruel-like fluid.

Liver, spleen, and kidneys quite healthy; the latter a little more congested, perhaps, than usual.

The lower two-thirds of the *vagina* were congested, and there was some congestion also of the upper part of this tube, but no excoriation or other change.

Uterus healthy. The *bladder* contained a large quantity of apparently healthy urine, and was itself healthy.

The *flesh* of the animal was perfectly healthy, and there was no emphysema.—J. S. B.

(18.) Cow.—Royal Veterinary College.—Examined November 9th, 1865.

The interior of the *mouth*, including the *palate* and greater part of the *tongue*, were as nearly as possible healthy; but the posterior portion of the *tongue* and the *fauces* and *pharynx* generally were congested. The epithelium was a little granular, and in the first two or three inches of the *œsophagus* formed thickened granular flakes studding the surface irregularly. The epithelium had come away in small irregular patches from the upper surface of the base of the tongue.

The interior of the *larynx* was generally congested, the congestion being especially deep above and below the arytenoid cartilages and vocal cords. In the last of these situations there had been abundant sub-mucous extravasation (producing tracts of reddish black discolouration) and some little escape of blood into the cavity of the larynx.

The *trachea* was generally somewhat congested, especially in the posterior three-fourths of its circumference, and in a greater degree above than below. In these situations the congestion was in spots and in streaks which ran more or less into one another, but apparently rarely amounted to actual extravasation. The tube was lined throughout with a yellowish opaque mucous secretion which adhered to the surface, and was in some parts mixed with clots of blood.

The *bronchi* and the *bronchial tubes*, both large and small, contained a large quantity of coagulated blood in the form of cylinders moulded to the tubes; and the mucous lining was thickly studded with reddish black patches and streaks of sub-mucous extravasation. These were most abundant in the smaller branches, some of which were in consequence almost uniformly black.

Both lungs were generally crepitant; and both, but more particularly the right, were congested in the greater part of their extent. There was no interlobular emphysema. *Pleuræ* and *pericardium* healthy. The surface of the back of the heart presented numerous large bruise-like markings. The *heart* was firm in consistence, and its cavities contained some fluid blood with small coagula. The lining membrane of the left ventricle presented a good many sub-serous extravasations.

Peritoneum healthy. *Liver* pale and somewhat decomposed, but healthy. *Gall bladder* full of healthy bile. *Spleen* healthy. Lower part of *œsophagus* healthy.

The *rumen* presented slight congestion in places, and the epithelium separated with great facility.

The *reticulum* was healthy.

The *omasum* presented diffused tracts of congestion, but no further indication of disease.

The *abomasum* was generally congested, especially near the pylorus; but nowhere deeply congested. In the latter situation there were two ulcers of somewhat irregular shape and from ½ an inch to ¾ long, in which the mucous membrane seemed to have been destroyed, and in which the submucous coat seemed covered with a little yellow adherent slough. A more careful examination of these ulcers showed that the mucous membrane had not been actually removed, but altered in character, and converted into the sloughs which still adhered to the subjacent tissues, and which were partially separated by a line of demarcation from the surrounding healthy membrane. The sloughy patches consisted of mucous membrane condensed and hardened and opaque and yellowish brown, and about one-third as thick as the healthy membrane around. Under the microscope no new elements (no elements, that is to say, additional to those of the healthy membrane,) were recognized, except perhaps an increase of granular matter; but everything was yellow and everything was indistinct. Everything seemed to have undergone a kind of atrophy. My impression was that the follicles had lost their epithelium in great measure, had collapsed, and that the intervals between them were occupied by the remains of some exudation, probably blood.

The *rectum* was deeply congested along its prominent folds, and towards the *anus* the congestion became uniform. There were streaks and patches of congestion throughout the *cæcum*, and a little in the commencement of the *colon*, but otherwise the large intestines were healthy.

The *small intestines* were generally healthy, presenting here and there, however, slight congestion. The intestine contained throughout a thin yellowish milky fluid.

Kidneys much lobulated and somewhat congested, but healthy. *Bladder* healthy.

The lower part of the *vagina* was congested, and the epithelium of the margins of the *vulva* was granular.

The *uterus* was very large and full of a bloody fluid.

The *flesh* of this animal was healthy looking, and the cellular tissue was free from emphysema.—J. S. B.

(19.) Cow.—Royal Veterinary College.—Examined November 10th, 1865.

The inside of the *lips*, the *gums*, and the under surface and sides of the tip of the *tongue* were congested and covered with irregular patches of granular thickened epithelium. The *roof of the mouth* presented to some extent a similar condition.

The root of the *tongue* (both on the sides and dorsum), the *pillars of the fauces*, the *soft palate*, and *pharynx* were all more or less congested and covered with soft opaque pulpy epithelium, which in some places had become detached, and by this detachment had produced (especially on the sides of the tongue) rounded excoriations. The first four or five inches of the *œsophagus* were studded with spots and patches of flaky epithelium, which were especially abundant at the upper part. The lower part of the *œsophagus* was healthy.

The *larynx* was not generally much congested; but there was some rather deep congestion, together with some spots of sub-mucous extravasation, both above and below the vocal cords. And in both of these latter situations there were extensive irregular patches of rather firmly adherent opaque yellowish lymph, or exuberant epithelium. The *trachea* was moderately congested in its whole length, and thinly studded with hæmorrhagic spots. These were most abundant in the upper part, and from many of them small black-coloured clots protruded into the canal of the trachea. The tube was lined throughout with a thickish layer of opaque yellow, tenacious and somewhat adherent lymph, and contained in its lower half a cylinder of blood smaller than the capacity of the tube and partly decolorized upon its surface. *Trachealis muscle* healthy.

The *lungs* presented very abundant, indeed almost universal, interlobular emphysema, which extended copiously into the pulmonary subpleural tissue. The lungs were generally crepitant and pale, but the anterior edges to some extent were congested, and here and there carnified. The *bronchial tubes* were filled throughout with mucus and cylinders of blood (generally not much smaller in diameter than the canals in which they lay), and were studded with spots and patches of sub-mucous extravasation. These were rare in the bronchi and large bronchial tubes, but in the smaller ones were exceedingly abundant, and running together formed tracts of reddish-black discolouration. There was much emphysema in the posterior mediastinum and about the pericardium. *Pleuræ* healthy.

Pericardium healthy. The *heart* was of firm consistence, presented a patch or two of sub-pericardial hæmorrhage at its base, and a few points of sub-endocardial hæmorrhage in the left ventricle. The cavities contained a small quantity of fluid blood.

Peritoneum healthy. *Liver* large and firm and somewhat cirrhosed. The walls of the larger ducts were opaque and white, and dense, and fully one-sixth of an inch thick. *Gall bladder* large, and full of pale but healthy bile. *Spleen* healthy.

Rumen and reticulum healthy; epithelium firmly adherent. The *omasum* was generally healthy, and the epithelium firmly adherent to its surface. The free edges of some of the folds, especially those portions of them near the abomasum, were somewhat thickened, and irregularly but very shallowly scalloped out, and slightly congested. The papillæ in the neighbourhood of these parts had in great measure disappeared. The edges presented the appearance of having been destroyed by ulceration and undergone subsequent cicatrization. There was no other disease whatever.

The *abomasum* was generally, but not deeply, congested, and in its lower fourth, the mucous membrane was studded with a considerable number of irregularly round or oval shallow depressions from a quarter to one-third of an inch in diameter, in some of which the surface was perfectly smooth. There was no discolouration about them and no actual ulceration.

The longitudinal folds of the *rectum* were congested, and the congestion was especially deep about the *anus*. The *colon* generally was free from congestion, and the *cæcum* presented only irregular patches of not very deep congestion. The *small intestines* were as nearly healthy as possible throughout.

Kidneys somewhat congested, but healthy.

The *bladder* was contracted and empty; and there had been a little hæmorrhage beneath some portions of its mucous membrane.

The lower part of the *vagina* was somewhat deeply congested, and the epithelium around its external orifice was a little granular.

The *uterus* was considerably enlarged.

The *mammæ* contained a good deal of milk, and were much congested throughout. There was no appearance of eruption on the *skin of the udder* or of adjacent parts.

The *brain* was somewhat congested on the surface, but otherwise quite healthy.

The *flesh* of this cow was in excellent condition. There was no trace of general emphysema.—J. S. B.

(20.) Cow.—Royal Veterinary College.—Examined November 21st, 1865.

The *lips* and *gums*, and greater part of the *tongue*, and interior of the *mouth* generally, were healthy. At the *root of the tongue*, however, and on the *pillars of the fauces*, the epithelium was opaque, and in some places granular, and had become here and there detached. The *pharynx* was somewhat congested, but otherwise healthy.

Larynx.—There was deep congestion above each *vocal cord*, extending somewhat on to and below the cord. Each patch of congestion was irregularly circular, about ¼ inch in diameter, and faded away imperceptibly at the circumference. In the centre of each, and corresponding pretty nearly to the vocal cord, was an irregular pyriform patch about an inch long and half an inch broad, in which the surface was covered with a dirty buff-coloured pulpy exudation, and in which the mucous membrane was evidently in process of sloughing. (Plate XVIII.) The congestion around these patches, which was generally purplish or livid, became of an intense blue-black in the zone that immediately bounded the sloughing surfaces.

The same change had occurred in the angle of meeting of the *arytenoid cartilages*. Here, for the length of an inch vertically, sloughing had taken place, and this had extended into the tissues for the depth of half an inch. The sloughing part was buff-coloured here also, and the mucous membrane, to some little distance around, was of a deep livid tint.

The sub-mucous tissue of the larynx corresponding to the posterior portion of the cricoid cartilage (the continuation of the trachealis upwards) was infiltrated with blood. There was a small brick-red coloured clot lodged in the rima glottidis.

The upper part of the *trachea* was scarcely congested, being, perhaps, a little pinker than in health; but in the lower part of the tube, the mucous membrane was uniformly congested, and presented also a few hæmorrhagic points. In this latter situation, too, the *trachealis muscle* was infiltrated with blood. The tube contained a large quantity of frothy mucus.

The *lungs* were in the greater part of their extent crepitant, and presented abundant interlobular emphysema. In the substance of the right lung was an emphysematous space as large as one's fist. The middle lobe of the right lung, and the anterior part of both the upper and lower lobes were solid, congested, and studded with opaque buff-coloured patches, lacerable, granular, and evidently pneumonic—the pneumonia having gone on in places to suppuration. The corresponding portions of the opposite lung were similarly affected, only in a less degree; and there was here one large patch of pulmonary apoplexy.

The *bronchial tubes* were generally congested; and those of the right lung presented spots of sub-mucous extravasation. They contained a good deal of mucus, together with irregular cylinders of a kind of flocculent, fibrinous material, which was probably in part decolorized coagulum.

Pleuræ healthy, with the exception that the parts in the neighbourhood of the roots of the lungs were studded with patches of sub-serous extravasation.

Pericardium generally healthy; but at the base there was a good deal of congestion in the shape of fringe-like patches. The anterior surface of right ventricle of the heart presented three or four large sub-serous extravasations.

The substance of the *heart* was tolerably healthy, and the endocardial surface was also healthy. All the cavities contained large coagula, which were most abundant in the right ventricle.

There was very abundant emphysema along the posterior mediastinum, and in the tissues around the base of the heart.

Peritoneum healthy. *Œsophagus* healthy.

Rumen and *reticulum* healthy.

Most of the folds of the *omasum* were healthy; but about half a dozen of them were distinctly diseased. These were studded with circumscribed patches, consisting partly of congestion and partly of slough. In most cases the slough was becoming separated, and in two or three perforation had taken place. The smallest of these were about a quarter of an inch in diameter, and the largest (which occupied the free edge or its vicinity) were oval, and about an inch long. One of the diseased folds presented two circular perforations (one a third of an inch in diameter, the other about 1¾ of an inch), the margins of which were neither thickened nor congested, but perfectly smooth and healthy looking.

The *abomasum* was generally redder than natural, but the congestion was very slight. One or two of the folds presented a few small congested points; and on one was a minute depression, looking like the remains of a shallow ulcer.

The *rectum* was deeply congested, especially in its lower part, in which situation the congestion was uniform.

The *cæcum* was deeply congested in its whole extent, but congested only.

The *ascending colon* presented a few congested patches, but the remainder of the colon was healthy.

Almost the whole of the *small intestine* was intensely and uniformly congested, and adhering to the surface was a quantity of blood-stained mucus. *Peyer's patches* presented in many instances a dirty greenish tint; and two or three of them presented patches apparently of adherent lymph, together with slight excoriations. The parts least congested were the last foot or two of the ileum and the commencement of the jejunum.

Liver congested; some of the ducts thickened; but otherwise healthy. *Gall bladder* full of bile. *Spleen* healthy.

The surface of the *kidneys* presented a few circumscribed congested patches; kidneys otherwise healthy. The *urinary bladder* was nearly empty; its mucous membrane was somewhat congested.

The *vulva* was slightly congested, but the epithelium was not affected. The *vagina* was healthy. The *uterus* was large, and contained a partly decomposed fœtus about half a foot long.

Brain healthy.

Microscopic examination.—Slough on larynx.—No parasitic growth discoverable; numbers of crystalline bodies, looking much like triple phosphate; abundance of oil, of granular looking epithelium, of indistinct corpuscles and of granular matter, together with portions of fibrous and elastic tissues.

Omasum.—A jointed fungus, consisting of branching transparent cylinders, tending to terminate in rounded and dilated extremities, and varying in thickness from about $\frac{1}{4000}$ to $\frac{1}{2000}$ inch, was discovered on the inflamed parts of the omasum. (Plate XXIV. B.) They were not seen at all on the healthy folds, and were most abundant on the parts that had sloughed; but I did not fail to find some of them in every diseased patch I examined. They affected the epithelium, but evidently invaded also the tissues beneath. The epithelium adhered much more firmly to the diseased patches than to the healthy membrane, and in fact had in many cases to be scraped off. On comparing the diseased epithelium with the healthy, it seemed to me to be infiltrated with some inflammatory exudation (lymph), which rendered the cells thicker than in health, and obscured their nuclei. Over the simply congested patches it seemed a little more glassy looking, and a little more nebulous than in health; but over the sloughing parts it was opaque and minutely granular. The granular character was well shown under the action of acetic acid. Very much the same kind of change was observed in the substance of the folds themselves. The sloughing portions were exceedingly opaque; and this opacity was evidently due to the presence of abundant granular matter occupying and obscuring all the tissues. In the patches wherein the disease was less advanced, the minute papillæ covering the surface of the membrane seemed swollen, and occupied by blood and other exudation, which, however, presented no microscopic elements. In these, under the action of acetic acid, all the elements visible in the healthy tissues were plainly distinguishable, viz., the elastic material forming the basement membrane, the nuclei of the smooth muscular fibres, and those of the vessels ramifying within them.

Peyer's patches.—The opaque buff-coloured material on the surface of Peyer's patches was found to consist chiefly of nuclei and round cell-like bodies, which were probably an exudation from the granular crypts in this situation.

There was some emphysema in the loins about the kidneys, but none about the body generally.

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The *flesh* was in good healthy condition.

The *skin* of the udder and teats of this cow was diseased in a very marked degree. On the teats, the epidermis was thickened, flaky, and fissured, the fissures extending even into the true skin. On the udder, the eruption consisted chiefly of a somewhat greasy thick exudation, which formed spots more or less confluent, and which on removal was found to be distinctly continuous with the contents of the hair sheaths and sebacious follicles, which were much increased in bulk. The subjacent skin was congested, and in one or two places hæmorrhage had taken place slightly, and had become mixed with the material of the crusts. These latter consisted of sebacious matter, epidermis, and pus-like corpuscles, which were sometimes grouped into masses.—J. S. B.

(21.) Cow, examined in the Cattle Market, December 4th, 1865.

This cow was driven to market for sale on the pretence that it was healthy, and evidently had not been long affected. The symptoms were, however, very decided, and emphysema was detected in the loins. The animal was slaughtered in the usual way shortly after it was brought, and examined an hour or two after being slaughtered.

The epithelium of the *lips and gums* was slightly detached, and there was a little congestion. There was also a little similar affection of the under surface of the *tip of the tongue*, of the root of the organ close to the larynx, of the posterior part of the *palate*, and of the *pillars of the fauces*.

The *larynx* was only very slightly congested, and its lower part was invested in a thin, transparent, tenacious film of exudation, which adhered slightly to the surface.

The *trachea* was very slightly congested throughout; but immediately below the larynx there were a few points of sub-mucous extravasation; and the lower part of the tube presented some increase of congestion.

The trachea contained a good deal of slightly translucent and tenacious mucus, which at the upper part formed a slightly adherent film.

The *bronchial tubes* were loaded with similar mucus, and their lining membrane, though generally pale, was studded here and there with congested points. The *lungs* were pale and crepitant, and presented distinct though not advanced interlobular emphysema. *Pleuræ* healthy. *Pericardium* healthy.

Heart firmly contracted; muscular tissue healthy; cavities empty; patches of sub-endocardial hæmorrhage in various parts of the left ventricle, but chiefly at the apices of the musculi papillares.

Peritoneum healthy. *Œsophagus* healthy. *Liver, spleen, kidneys* all healthy. *Gall bladder* full of natural bile. *Rumen* and *reticulum* healthy; contents healthy; epithelium adherent.

Omasum with dry, caked contents; epithelium adherent. Some of the leaves presented circumscribed patches of congestion, circular or nearly so, and from an inch in diameter downwards. The patches were congested only, and presented no appearance of sloughing.

The *abomasum* was somewhat congested throughout; but the congestion was nowhere intense. The free edges of three or four of the folds presented a peculiar diseased condition. (Plate XIV. A.) This consisted in a kind of intense reddish black interstitial discolouration, distinctly circumscribed, and without any deposit on the surface, or any change sufficient to affect the natural polish of the part. The diseased tracts varied from an inch to two or three inches in length, generally occupied the free edge in its whole thickness, and extended for a line or so into the substance of the fold; but a few were scattered on the face of the folds in the neighbourhood of the free edge, and involved only one surface. One or two of those occupying the free edge had broken down, and left a linear ulcer, the margins of which consisted of the breaking-down morbid tissue.

Besides these there were, both in the vicinity of the folds and in the pyloric half of the stomach (but chiefly in the latter), numerous irregularly polygonal depressions (Plate XIV. B.) from half-an-inch in diameter downwards; of which the floors were mostly smooth, but a little pinker than the contiguous healthy membrane; and of which the margins were mostly a little tumid, granular, and studded with minute points of congestion. One or two of these presented slight adherent sloughs; and one was a distinct oval ulcer perforating the mucous membrane completely.

The *small intestines* were cursorily examined only; they seemed to present here and there slight congestion, and to contain very fluid contents. *Peyer's patches*, too, appeared healthy. The lips of the *ileo-cæcal orifice* were tumid and deeply congested. The *cæcum and ascending colon* were studded thickly and somewhat irregularly with lines and patches of various lengths and sizes of deep congestion—of congestion that seemed indeed in many places attended with sub-mucous hæmorrhage. The remainder of the large intestine was almost perfectly healthy; the *rectum* indeed was pale. The contents of the cœcum and early parts of the large intestine were unnaturally fluid; but the rectum contained healthy fœcal matter.

was slight There congestion of the *vulva;* but the *vagina* was natural.

Microscopical examination.—The patches of congestion on the omasum were found to present an abundance of the vegetable fungus discovered in former cases. (The microscopical examination was made an hour or two after the autopsy.) No such fungus was seen on the healthy surface.

The diseased parts of the edges of the folds of the abomasum were found to be made up almost entirely of solid-looking cylinders, which seemed to consist of some transparent solid material, which had become cracked and broken up more or less into variously shaped but irregular fragments. (Plate XXV. B.) In some cases the cylinders were broken here and there transversely only. In other cases the fractures had taken various directions. The material constituting these cylinders had, according to the thickness of tissue examined, a pale yellowish brown tint, or a deep sepia colour, or shades of brown intermediate between these extremes. It seemed to me that these cylinders were the remains of the glandular follicles of the part, which (with their epithelium) had undergone some kind of infiltration, probably with some of the elements of blood.

The congested edges of the small shallow ulcers were found to owe their redness to the presence of numerous minute vessels distended with blood.

The animal was in good condition and its *flesh* seemed healthy.

There was very abundant emphysema in the posterior mediastinum and along the œsophagus, and in the cellular tissue surrounding the upper part of the pericardium. There was also emphysema about the kidneys.—J. S. B.

(22.) Cow, examined at the Cattle Market. December 4th, 1865.

This cow belonged to the same owner as the last, and was brought at the same time to market. It showed evidence of disease, but the symptoms were less pronounced than in the former case. It was slaughtered in the usual way, and was examined an hour or two after death.

Lips and gums slightly excoriated; slight excoriation of posterior part of *tongue*; other parts of *oral cavity* and *pharynx* healthy.

Larynx healthy. The *trachea* had a general pale pinkish tinge, but was rather more deeply congested at the upper part than elsewhere. It contained a good deal of frothy mucus.

The *lungs* were crepitant and presented a small quantity of interlobular emphysema; they contained also a few small hydated cysts. The *bronchial tubes*, which were not congested, contained a large quantity of frothy mucus. *Pleuræ* healthy. *Pericardium* healthy.

Heart contracted, empty, and healthy, except that the apices of the musculi papillares of the left ventricle were congested; there was, however, no extravasated blood.

Peritoneum healthy. *Liver, spleen,* and *kidneys* healthy. *Œsophagus* healthy. *Rumen and retriculum* quite healthy. Epithelium adherent, contents natural.

The *omasum* contained much hard, caked material between its folds. The epithelium was adherent to the folds, and these presented no circumscribed spots of congestion. Some of them, however, presented a little diffused redness.

The *abomasum* was unusually congested, especially in the neighbourhood of the folds and in the folds themselves. The pyloric half of the organ presented large numbers of shallow ulcers or depressions (exactly like those described in the last case). They were irregularly polygonal—some in fact almost stellate; their floors were smooth, but redder than surrounding parts, and the margins were slightly tumid and granular and congested—the congestion being slightly spotty.

The *small intestines* were only cursorily examined; and beyond the fact that those *Peyer's patches* which were seen were healthy, and that there was here and there slight congestion of the mucous membrane, and that the contents of the bowels were fluid and something like dirty pea-soup, nothing particular was noted. The *cæcum and ascending colon* presented numerous spots and streaks, irregularly and pretty thickly distributed, and of various dimensions, in which the redness seemed due in part at least to hæmorrhage beneath the surface. The rest of the large intestine, including the *rectum* and even the *anus*, was pale and healthy.

There was very little congestion of the *vulva*, and the *gina* was healthy.

Microscopical examination.—The mucous membrane of e cœcum and ascending colon was examined, and while vas clearly ascertained that the spots of redness were in ne measure due to mere distension of the minute vessels h blood, it was also clearly seen that much of it was pendent on extravasation of blood into the tissue be- een the follicles. In the latter case the spaces referred to re of a uniform and deep redness, and this condition upied the spaces over some definite and often consider- e area. The follicles themselves and their contents seemed lthy. The nature of the change was exactly like that served in the abomasum (*see* case 24).

The *flesh* of this cow seemed in good condition. There s a little emphysema in the lumbar region, and a still ger amount in the mediastinum.—J. S. B.

.) Bullock condemned at the Cattle Market; slaugh- tered December 3rd; examined December 4th. The animal was said to have had well marked signs of disease, but was in good condition.

The *mouth* and parts connected therewith were only very htly affected; *base of tongue* slightly affected only.

The *abomasum* was extremely diseased, but the disease evidently in an early stage. (Plate XII.) The mucous face was universally congested, and the congestion was re or less patchy. But the surface was everywhere dded with small points of intense redness. These varied m the size of pin-holes to half a line or a little more in meter. They were dusted, so to speak, over the whole face, but somewhat irregularly, so that while there were nerous groups and clusters of various sizes, there were nerous intervals in which they were comparatively sparse. ey were not more numerous at the pylorus than on the ds. From many of the groups, and especially from se in the pyloric half of the stomach, small clots pro- ed (clots from the size of a pea downwards) which could ily be scraped away, leaving the subjacent mucous surface ole, but studded with the above described points of con- tion. There were also a few shallow ulcers here and re, to one or two of which small sloughs adhered.

The *omasum* was only cursorily examined; the contents e hard, and I saw no patches of congestion; but there ght have been some.

Microscopical examination.—The points of congestion in abomasum were examined and found to consist partly of reme loading of the vessels with blood, but very gene- y to extravasation between the tubules. The ramifi- ons of some of the vessels were remarkably distinct; the ravasations formed roundish patches in which the whole the intertubular spaces were loaded with blood. The icles seemed in all cases natural.—J. S. B.

4.) Cow admitted into Veterinary College, November 30th, and examined December 4th, 1865.

Slight affection of the *gums and lips;* mucous membrane back of *tongue, soft palate and pillars of fauces* not con- ted, but covered with flakes of soft thickened epithelium. *Larynx* healthy. The *trachea* was scarcely congested, towards its lower part the mucous membrane presented ew hæmorrhagic points. The *lungs* were generally, ugh sparely, crepitant, and presented a moderate ount of interlobular emphysema. They presented a good ny patches of collapsed tissue, and were for the most somewhat congested. The lungs contained a few small atid cysts. The larger vessels were loaded with blood, ly coagulated but chiefly fluid.

The *bronchial tubes* were generally pale, but presented a congested spots. The lower part of the trachea and the chial tubes throughout were loaded with a frothy fluid soap-suds.

Pleuræ healthy. *Pericardium* healthy. The muscular ue of the *heart* was healthy; but there were scattered hes of extravasation beneath the lining membrane of left ventricle. The patches were largest at the apices he musculi papillares.

All the cavities contained dark-coloured coagula.

Œsophagus healthy. *Peritoneum* healthy. Some of the s of the *omasum* presented a little diffused congestion, with this exception the organ was healthy. The helium was adherent, the contents rather hard.

The *abomasum* was scarcely redder than natural in any s, and certainly did not present any distinct patchiness ongestion. The folds presented here and there shallow ressions, not perforating the whole thickness of the cous membrane, but presenting well defined thin ing edges. Similar depressions were observable here there throughout the pyloric half or third of the nach; but there were in this situation also numerous diseased patches, which evidently formed the earlier stage of the condition just described. These patches varied from a line or two to three-quarters of an inch or even an inch in diameter. The smaller ones were round or oval, but the larger more or less irregular in form. Their margins were neither thickened nor congested in any degree; but their surface was formed of a thin soft layer, more or less imperfect, of a nearly black material, which looked like a slough of tissue infiltrated with blood. In several cases the sloughs formed a uniform layer, slightly adherent to the subjacent surface and to the margins, but in some cases (and these were especially the smaller patches), the sloughs had become more or less perfectly detached at the margins, and in some (and these were especially some of the larger ones) the sloughs had partially disappeared—portions remaining attached to the margins, sometimes forming irregular shreds, sometimes a distinct ring. On removal of these sloughs the subjacent surface was pale and smooth, but depressed below the surrounding level of the mucous membrane. The patches were in fact distinctly shallow ulcers. Most of these and all the larger ones were situated near the pyloric orifice. I may add that one small ulcer presented an adherent slough of considerable thickness. (Plate XIII.)

Rumen and reticulum healthy, contents healthy, epithelium somewhat soft.

The *cæcum* presented streaks of congestion at its free extremity, and in the course of its length; and was studded (dusted, so to speak), with small hæmorrhagic points, to some of which small clots slightly adhered. The same condition of congestion with occasional hæmorrhage was visible throughout a considerable portion (chiefly the ascending portion) of the *colon;* and the fæcal contents of this part, which were tolerably solid, were slightly though distinctly mixed with blood.

The *rectum* in its lower part was deeply and uniformly congested.

The lips of the *ileo-cæcal orifice* were deeply congested and tumid.

The lower part of the *small intestines* presented streaks and spots of not very intense congestion; and *Peyer's patches,* of which a few were examined, seemed healthy.

Liver, spleen, and *kidneys* healthy, excepting that the liver contained a few small hydated cysts.

Bladder almost empty. Mucous membrane healthy. The margins of the *vulva* were congested but not deeply; the *vagina* itself was as nearly as possibly healthy.

The *uterus* contained a fœtus six weeks or two months old. The cotyledons and rest of the organ were natural. The fœtus itself was pale and somewhat soft, perhaps a little decomposed.

Microscopical examination.—A minute examination of the sloughs in the abomasum showed that they occupied the whole thickness of the mucous membrane, which was here scarcely half the normal thickness. The sloughs were of a deep brown or blackish hue throughout; and on microscopical examination, it was seen that their tubules were shrivelled and occupied by a sepia-coloured exudation, which had a tendency to break transversely and in other directions into angular masses of various sizes. The true epithelium was either absent or masked by this exudation, and no healthy tubules were recognized. There was also much granular pigmentary matter in the tissue between the tubules.

The congestion of the cæcum was in part due to congested vessels, but in great part to patches of sub-mucous extravasation. The vessels were in many parts very numerous and distended with blood, but the congestion was not always great in the neighbourhood of the extravasations. The patches of extravasation were more or less circular, and in them the whole of the intertubular spaces were full of blood. (Plate XXVI. a.)

The *flesh* of this animal was healthy-looking, but it was perhaps rather lean. There was no emphysema in the loins or about the kidneys, but there was a good deal in the mediastina and along the œsophagus.—J. S. B.

(25.) Heifer. Royal Veterinary College. Examined December 15th, 1865. Inoculated.

Lips, gums, and *palate* much affected.

The tip of the *tongue,* beneath and at the sides, was in a marked aphthous condition; or perhaps rather, the epithelium corresponding to this region was almost uniformly thickened, opaque, granular, and soft. The greater part of the dorsum of the tongue was studded with irregularly rounded spots, in which the epithelium was thickened and softened and here and there separated, and corresponding to which the subjacent surface was invariably congested. The back of the *tongue* with the *pillars of the fauces* and the *pharynx* was intensely congested and covered more or less with opaque thick friable epithelium. Here

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and there this had become detached, leaving excoriations; and at several points sub-mucous hæmorrhage had occurred. The upper part of the *œsophagus* also was congested, studded with hæmorrhagic points, and with numerous granular patches of opaque thickened epithelium. This latter condition, in the form of minute rounded spots and short longitudinal streaks, thickly studded the rest of the œsophagus, which, however, was pale.

The *larynx* was deeply congested and presented a few points of sub-mucous hæmorrhage, which were especially abundant at the angle in which the vocal cords meet anteriorly, and below the arytenoid cartilages. A little exudation of what looked like lymph adhered to the surface of the vocal cords. The *trachea* was congested and presented spots of sub-mucous hæmorrhage. The tube contained a good deal of mucus. The *trachealis muscle* was healthy. The *bronchial tubes* were in much the same condition as the trachea. The *lungs* were congested and sparely crepitant, here and there carnified, and presented traces of emphysema. *Pleuræ* healthy. *Pericardium* healthy. There were a few petechial spots on the outer surface of the *heart*, and patches of hæmorrhage in connexion with the musculi papillares of the left ventricle. The heart was otherwise healthy.

Peritoneum healthy.

Liver, spleen, pancreas, and *kidneys* healthy.

Rumen and *reticulum* healthy. The contents of *omasum* were much caked, and the folds presented an early stage of disease. Most of them were studded with spots of hæmorrhage occupying their entire thickness. The smaller spots were roundish, yet somewhat irregular in shape, the larger were altogether irregular. The former varied from a line to ¼ inch in diameter, the latter measured sometimes an inch. The diseased spots presented little or no thickening of tissue; they had uniformly the deep red, almost black, colour of effused blood, and there was nowhere any tendency to gangrene. The papillæ upon these patches were for the most part quite pale. Many of the vessels of the folds were rendered distinct by still containing blood, and it was evident in many cases that the patches of congestion had occurred in the course of the vessels. The epithelium was soft and did not adhere to the congested spots. The *abomasum* presented a good deal of congestion, especially in the situation of the folds; and here and there were many points and patches of more intense redness, of which some were manifestly due to sub-mucous hæmorrhage. Towards the pylorus there were many shallow excoriations. The *anus* and *rectum* were deeply congested; there were a few points of congestion about the apex of the *cœcum;* and a good deal of fine arborescent congestion scattered about this and the *ascending colon;* but the congestion was nowhere intense, and the lips of the *ileo-cœcal orifice* were healthy. The *rectum* contained blood together with other contents. The *small intestines* were generally healthy, as were also *Peyer's patches.* The *vulva* and lower part of the *vagina* were intensely congested.

The *flesh* of this heifer seemed healthy. There was no general emphysema.

Microscopic examination.—The granular exudation (?) at the tip of the tongue presented:—healthy epithelial scales: epithelial scales which seemed unnaturally granular: many nuclei surrounded by a filmy and granular imperfect envelope, which looked not unlike disintegrating cells, and sometimes like compound granular cells: numbers of corpuscles almost exactly like pus corpuscles, both in size and behaviour, under the influence of acetic acid: some free granular matter: and crystals, apparently of triple phosphate.

The opaque spots on the dorsum of the tongue, and the exudation at the base of the tongue and on the pharynx presented almost identical characters. It seemed to me in all cases that an exudation, consisting chiefly of cells resembling pus, and of some fluid tending to become granular, had been poured out here and there by the mucous surface, and had infiltrated and softened the epithelium over the portions of surface thus affected. In most cases (if not all) it seemed to me that the pus-like material was most abundant on the deeper aspect of the epithelial layer. I should add, the pus-like corpuscles did not generally float free, as is mostly seen in true pus, but were generally aggregated into masses. The fluid, moreover, which was mixed with the elements of the affected tracts of epithelium, seemed to be of the nature of mucus, and coagulated under the influence of acetic acid.

The spots along the œsophagus presented, so far at least as I observed, no pus-corpuscles, but the epithelium was extremely granular, and much of it seemed refractive, as though filled with some refractive exudation.

The soft film of exudation adhering to the vocal cords consisted of very granular epithelial cells, many pus-like cells aggregated more or less into masses, and abundant crystals apparently of triple phosphate.

The blood corpuscles escaping from microscopic vessel seemed in all cases quite natural.

The congested spots of the omasum were reserved fc microscopic examination; but by exposure to air an moisture, the congestion in a short time entirely disap peared.—J. S. B.

(26.) Heifer. Royal Veterinary College. Examined December 17th, 1865. Inoculated.

Lips and *gums,* congested, excoriated, and studded wit patches of soft, opaque, thick epithelium (Plate III.). Th epithelium of the under surface and sides of the *tip of th tongue* was generally opaque and granular, and in place separating. The same condition, only in a much more ac vanced degree, and with the addition of a good deal congestion, existed along the sides and upper surface of th root of the tongue (Plate IV.), and throughout the who of the *pharynx,* the *soft palate* and *pillars of the fauce* The upper surface of the anterior three-fourths of th *tongue* was studded with small opaque spots, in which th epithelium was thickened, softened, and beneath which th mucous membrane was congested. The surface of the *haz palate* was congested and the epithelium had become d tached, leaving well-defined round or oval patches of exc riation. Aphtha-like patches were abundant in the upp part of the *œsophagus,* and were scattered thinly throughо the rest of this tube.

Larynx a good deal congested, but there was no subm cous extravasation; the surface presented a good deal slightly adherent exudation. The *trachea* was congest throughout, but was also free from hæmorrhagic point it contained a good deal of muco-purulent fluid togeth with frothy mucus, the latter being very abundant in t lower part of the tube. The *bronchial tubes* also contain a large quantity of frothy fluid, together with a little ter cious mucus, but they presented additionally here and the cylinders of coagulated blood; they were but slightly co gested. The *lungs* were generally crepitant and somewh congested; presenting also a few carnified spots. He and there there was slight but quite distinct interlobu emphysema. *Pleuræ* healthy.

At the base of the *heart,* especially in front, there w numerous small petechial spots. There were also numerc patches of extravasated blood on the surface of the musc papillares of the left ventricle. The substance of the he was rather flabby, and its cavities contained a little par coagulated blood. *Pericardium* healthy.

Peritoneum healthy. *Rumen and reticulum* healthy; cc tents healthy. Contents of omasum somewhat cak *Omasum* itself quite healthy. The *abomasum* was genera uncongested; the folds however presented, thinly scatter a considerable number of small hæmorrhagic points; a a few similar spots were observed on other parts of surface; and immediately above the pylorus were two o sloughs one-third of an inch long, and above them seve shallow excoriations with congested margins. Through the *duodenum* (Plate XV.) were numerous patches of ir gular shape, from about an inch in diameter downwards which hæmorrhage had taken place beneath the muc membrane. These patches were studded with smaller deeper red spots, which depended upon hæmorrhage i the substance of the mucous membrane superficial to more extensive extravasations. A few similar hæmorrha points studded the intervening portions of the muc membrane.

The upper part of the *jejunum* had a deep slate colo and the lower part of the *small intestines* presen patches of arborescent congestion. The *ascending co* presented deep congestion along the prominent folds, the rest of the colon was healthy. At the extremity of *cœcum* there were a few spots of congestion; and the of the ileo-cœcal valve were congested. A large patch (parently one of Peyer's patches) in the colon adjoin the ileo-cœcal orifice was honeycombed, and from some the orifices a kind of cheesy matter exuded. The conte of the bowels were much like pea soup. *Peyer's patc* were healthy.

The *rectum* presented very few patches of congesti these occupied chiefly the prominent folds, and on c inspection were seen clearly to consist in great meas of points of sub-mucous extravasation. The *anus* was p *Liver* rather pale, but healthy. *Gall bladder* full of parently healthy bile. *Spleen* healthy. *Kidneys* healt

The lower half of the *vagina* was congested. The c gestion was most intense around the external orifice. which situation there was a trace of aphthous condit At the upper part of the congested region the redness due entirely to the surface being studded with very mir round hæmorrhagic points, (varying however in size,) wi few longitudinal streaks of the same nature. The muc membrane of the *bladder* presented patches of congest

l the cavity contained a little healthy looking urine. The .cous membrane of the urethra presented a circle of sub-.cous extravasations of blood, which took a longitudinal ection and occupied the tube for about half an inch of its gth. *Uterus* pale and healthy, but the neck presented a points of sub-mucous hæmorrhage.

Brain and *upper part of cord* somewhat congested on the face, but otherwise healthy. A good deal of fluid was erved in the subarachnoid tissue of the cord.

Both the *bronchial* and the *mesenteric glands* appeared to somewhat congested.

The *flesh* of the animal was healthy-looking, and there s no emphysema either in the mediastina or elsewhere.

e *skin of the teats* was a little furfuraceous, but there was distinct eruption. The skin of the udder was very htly rosy.

Microscopical examination.—The patches of opaque epi-lium on the pillars of the fauces were found, as in the mer case, to consist of epithelial cells, some granular ne healthy; pus-like corpuscles mostly aggregated into erent masses; imperfect granular cells and nuclei; and stals of triple phosphate; and, again, as in the former e, it seemed to me that the pus-like cells were most ndant on the deeper aspect.

The transverse striæ of the muscular fibres of the *heart* e somewhat indistinct, and here and there a little granular. effusions of blood visible at the surface of the papillary scles extended to some little depth into the substance of se bodies; but the muscular fibres in this situation did differ from those of other parts.

The hæmorrhagic points seen in the *vagina* (Plate VI. c.) were distinctly ascertained under the microscope e due not to congested vessels but to extravasation. In points in fact where the extravasations were abundant, gested vessels were rare.—J. S. B.

) Cow of Colonel Talbot's.—Examined December 18th, p.m.—Died December 18th, 3 a.m.—Said first to have nown symptoms of disease on the 9th December.

The *lips and gums* presented a characteristic aphthous dition, and were congested in all those spots from which epithelium had separated or was separating. The pos-or part of the *palate* showed the same appearance. The of the *tongue* was healthy, but the dorsum was studded a small roundish yellow spots, in which there was kening and softening of epithelium, which was often ially separated, and could always be removed readily, ing the exposed area of mucous membrane deeply con-ed. The posterior part of the tongue and the *pillars of fauces* were congested, and their epithelium was mostly ular and soft, and had already disappeared from erous spots and irregular patches. The denuded parts specially congested. The rest of the *pharynx* was con-ed. The upper part of the *œsophagus* was congested, presented occasional aphthous spots. This tube erally, however, was healthy.

The *larynx* and *trachea* were congested in their whole nt, and presented numerous streaks and spots of in-sed redness; but there were not many hæmorrhagic ts, and these were chiefly in the larynx. The trachea ained a large quantity of frothy mucus, and some cious muco-purulent exudation, which adhered to its ace. Similar exudation adhered in greater abundance he surface of the larynx. The *bronchial tubes* were ested but presented few hæmorrhagic points. These ained also much mucus, and many of them presented of blood (? admitted into tubes accidentally). The s were congested, but crepitant throughout, and nted a small amount of interlobular emphysema. ræ healthy. *Pericardium* healthy. The muscular e of the *heart* were somewhat flabby, and its cavities nearly empty. There was abundant extravasation ath the lining membrane of the left ventricle, most ked (as usual) on the musculi papillares. The lining brane of the right ventricle was elevated in a remark-way by beads of sub-endocardial emphysema. The d in the vessels was generally fluid and dark coloured. *ritoneum* for the most part healthy. There were, how-, patches of congestion on the great omentum, and the rnal surface of the lower part of the small intestines intensely congested. *Liver* pale and rather firm, rently in a very early stage of cirrhosis. *Gall-bladder* of thin healthy bile. *Spleen* natural.

The contents of the *rumen* were natural and abundant. epithelium of the organ generally separated with ex-e facility, and it was found that the surface presented erous and extensive tracts of irregular congestion; and veral places (both in the papillary and in the smoother s of the organ) there were numerous irregular sloughs perhaps three-quarters of an inch in diameter down-ds. In the smoother part of the organ the sloughs were mostly small, and the diseased patches ran more or less into one another, forming two or three tolerably extensive tracts. These consisted partly of shallow sloughs, partly of shallow ulcers left by the detachment of the sloughs, and partly of intervening tissue more or less congested. In the papillary part of the viscus the patches had also a tendency to run together; they were always grouped, but often, nevertheless, distinct. Their form here was very irregular and angular, and they were almost perfectly black in consequence, chiefly, of the adhesion of the epithelium to their surface. The sloughs were generally separated more or less perfectly at the margins by a line of demarcation, but still adhered firmly to the subjacent tissues. These presented points of congestion, but were generally, to a depth of perhaps one-eighth of an inch, denser than the healthy tissues, and of a dirty greenish yellow tint. The *reticulum* was somewhat congested here and there, but otherwise quite healthy.

The *omasum* was full of hard caked contents, which carried with them (on removal) the epithelial lining. Most of the folds were more or less congested; the congestion sometimes formed circular patches of various sizes, but was more often irregular in shape, and sometimes of very considerable extent. The irregular patches, more particularly, had a tendency to run together, and to form by their union a mottled condition of the folds, or an irregular network of congestion, extending sometimes over nearly an entire fold. The congestion, even when extensive, was well defined. There were a few small spots of congestion not more than a line in diameter. There was no appearance of sloughing, and the epithelium did not adhere to the congested surfaces.

The *abomasum* was deeply congested throughout, and was studded with patches of deeper congestion, and with petechial spots. Both these latter were most marked on, and in the neighbourhood of, the folds. Immediately below the folds, and from that situation to within half a foot of the pylorus, were numerous sloughs of mucous membrane, varying generally from an inch to a quarter or one-sixth of an inch in diameter. These were of an olive-brown tint, soft and easy of removal, and occupied only the thickness of the mucous membrane itself. They were generally round or oval, but sometimes irregular in shape, and mostly at the margins were becoming or had become separated from the mucous membrane around. In some cases the mucous membrane appeared to have retreated from the sloughs (which still adhered to the sub-mucous tissue) and left between them an irregular annular interval in which the sub-mucous tissue was visible. One or two of the largest sloughs had penetrated to a considerable depth. There were also, both near the pylorus and elsewhere, numerous shallow polygonal or roundish pits, formed probably by the detachment of sloughs. The contents of this stomach were natural. The *duodenum* presented numerous petechial spots. The greater part of the *jejunum* (excepting only the last two or three yards) was uniformly and intensely congested, the mucous membrane being reduced to a deep red pulp, to which sanguinolent mucus adhered. The remainder of the *small intestines* was as nearly as possible healthy. Their contents were, generally, much like dirty pea-soup. The *cæcum* presented but little congestion, and the *ascending colon* was somewhat more deeply congested, but the rest of the *colon* was tolerably healthy. The *rectum*, however, and especially its lower part, together with the *anus*, was intensely congested. The *kidneys* and the *bladder* were healthy. The *uterus* was congested, both externally and within. The upper part of the *vagina* was natural; but the lower part, and the *vulva*, were considerably congested. There was no aphthous condition here.

The *conjunctivæ* were congested. *Udder* congested, containing some milk.

The *skin* of the *teats* and *udder* was examined, and found to present an abundant eruption of what looked like pustules more or less completely scabbed over, and having much resemblance to the crusted pustules of impitigo. (*See* description of eruption in cow 29).

The *flesh* of the animal was healthy, and there was no general emphysema, and none in the *loins*; there was, however, marked decomposition.

Microscopical examination.—The yellow spots on the *dorsum of the tongue* consisted of epithelium chiefly, with some granular matter, and cells much resembling pus. These latter were most abundant on the deep surface.

The sloughs of the *rumen* presented a moderate quantity of adherent, but apparently natural, epithelium; there were numerous triple phosphate crystals, but no vegetable fungus. The sloughing portion of the tissue beneath the epithelium was rendered exceedingly dark from the presence of abundant pigmentary matter, partly aggregated into irregular masses; but no other elements beyond those of the healthy tissues were recognized.

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The surface of the diseased patches of the *omasum* displayed an abundance of parasitic vegetable growth.

The sloughs of the *abomasum* were minutely examined; it was seen that they occupied the entire thickness of the mucous membrane, which had become much reduced in thickness, hardened, and of a deep brown or black colour. Microscopic examination showed that the blackness was due to the presence of a very large quantity of pigmentary matter diffused throughout the diseased tissues, but showing a marked tendency to become aggregated into small irregular groups or masses. Blood vessels were not distinguishable, and it appeared to me that the pigmentary matter was the remains of the colouring matter of the blood, which had been probably diffused among the tissues. In addition to these appearances, it was plain (on comparing the diseased with the healthy mucous membrane) that many of the glandular tubules had disappeared (had probably lost their contents, had become collapsed and shrivelled, and so undistinguishable from other tissues); and that those that remained had become shrunk, and that their epithelium had become refractive and solid, and often brownish, and had a tendency to form irregular angular masses, and that their nuclei had disappeared or become invisible. (Plate XXV. A.) The appearances gave me the impression that they had been caused by hæmorrhage into the tissues, with subsequent decomposition of the blood, and atrophy of the parts among which the blood had become diffused. In the healthy portions of the mucous membrane the tubules were exceedingly distinct and abundant, and their epithelial lining, with its nuclei, was always visible, and there was no granular matter.—J. S. B.

(28.) Cow belonging to Colonel Talbot.—Examined December 18th, 4 p.m.—Died December 17th, late in the afternoon.—Said to have been attacked with the Cattle Plague on the 9th December.

Lips and *gums* highly aphthous. The greater part of the *tongue* and *palate* was healthy; the posterior parts of both, however, and the *pillars of the fauces*, were congested, had the epithelium separated in numerous small patches, and presented elsewhere thickening and softening of epithelium. *Œsophagus* healthy.

The *larynx* and *trachea* were deeply congested, and presented numerous hæmorrhagic points and streaks, many of which were clustered, and to some of which small clots adhered. In the larynx the spots of sub-mucous hæmorrhage were chiefly collected about the angle formed by the meeting of the vocal cords in front, and below the vocal cords. The tubes contained, besides the blood above mentioned, much mucus. The *bronchial tubes* were congested, and those of the left lung were, like the trachea, abundantly studded with hæmorrhagic points. The tubes contained much mucus and some clots of blood. The *lungs* were crepitant throughout, somewhat congested, and presented a high degree of interlobular emphysema. There was much emphysema in the *mediastina*. *Pleuræ* healthy. *Pericardium* healthy. *Heart* somewhat flabby. Ventricles containing a little fluid blood. The lining membrane was generally blood-stained, and that of the left ventricle presented numerous ecchymoses.

Peritoneum generally healthy. The small intestines were much congested externally. *Liver* pale: gall-ducts thickened: *gall bladder* full of bile. *Spleen* natural. The *rumen* and *reticulum* were hastily and incompletely examined, but they seemed healthy and contained an abundance of food. The *omasum* contained dry caked contents, and the epithelium came away with them. The folds presented numerous circumscribed patches of congestion, to some of which the epithelium was adherent. Some of them were assuming in the central area a dirty brownish tint. The *abomasum* was intensely congested throughout, and contained very fluid contents. The *small intestines* were almost from one end to the other intensely and uniformly congested; and the mucous membrane was in many parts reduced to a red pulp. The intestines, however, contained only a thin brownish fluid, and apparently no blood. The *cæcum* was deeply congested, and a tract of deep congestion was observed in the *ascending colon*. But the rest of the *colon* and the *rectum* were little congested, and as nearly as possible healthy. *Kidneys* somewhat congested. The *genital organs* and the *bladder* were not examined. The *udder* was congested, and so were the *conjunctivæ*.

The *skin* upon the udder and teats presented a well marked and tolerably copious pustular (?) eruption. (See description in case of Cow 29.)

The *flesh* was healthy-looking, but the cellular tissue about the kidneys was highly emphysematous.

The internal organs were generally a good deal decomposed.

Microscopical examination.—The mucous membrane of the larynx and trachea was examined with care, and it was seen that the blood-vessels were generally exceeding distinct in all their ramifications, by reason of being load with blood-corpuscles. But the rounded and elongat spots were equally well ascertained to consist of blo extravasated into the tissues. (Plate XXVI. B.) T surface was thickly studded with crystals, apparently triple phosphate. The diseased patches of the omasu presented an abundant growth of vegetable fungus.—J.S.

(29.) Cow of Colonel Talbot's.—Examined Decem 18th, 1865, 3 p.m. Died December 18th, at 11 a.m. S to have first shown symptoms of the disease on the 1 December.

The *lips* and *gums* were slightly aphthous. The grea part of the *tongue* and the greater part of the *palate* w completely healthy; but the *soft palate*, *pillars of fauces*, and the *rest of the tongue* were congested, had t epithelium thickened and softened, and presented nur rous small deeply congested excoriations. *Œsopha* healthy.

Larynx and *trachea* very slightly congested, and nea empty of secretion. The *bronchial tubes* were in the sa condition as the trachea. The *lungs* were somewhat co gested, crepitant throughout, and presented distinct but advanced interlobular emphysema. *Pleuræ* healthy. *Pe cardium* healthy. *Heart* nearly empty and generally healt There was extreme sub-endocardial extravasation in co nexion with the left ventricle; this was most marked, a formed the largest patches, about the apices of the papill muscles; but patches of various sizes were scattered o almost the whole surface.

Peritoneum healthy, with the exception that there w some congestion, in patches, of the great omentum. *Li* pale: ducts much thickened: *gall-bladder* full of lig coloured bile. *Spleen* healthy. The *rumen* and *reticul* contained normal but unusually fluid food. The epit lium was adherent, and the organs were generally healt except that the rumen presented irregular patches of co gestion. The contents of the *omasum* were not caked, in f were natural. The epithelium adhered to the surface of folds, and these were generally healthy. Two or three the smaller ones, however, presented well-defined patches congestion at their free edges, and several of the large fo presented over a considerable surface marked tumefacti and reddening of the papillæ—the intervening spaces bei pale and healthy. The *abomasum* also contained healt contents. The mucous membrane was universally a intensely congested. The congestion was most inte upon and between the folds, and a little above the lorus; and in these situations the redness was patc and the surface was studded thickly with petechial spc No sloughs were visible, but there were a few shallow pits excoriations. The *small intestines* were in their whole tent somewhat congested. The congestion was, howev everywhere in the form of small patches, running more less into one another, leaving between them tracts healthy unreddened membrane. The contents of bowels seemed not unnatural. The *cæcum* contained little fæces, and was thickly studded with bands a patches of deep congestion. The *ascending colon* was a deeply congested, more deeply congested, in fact, than t cæcum; and here the congestion was more or less in t form of patches, but also formed several longitudi bands, corresponding to the prominent edges of the fol of the mucous membrane. These latter continued, with interruption, throughout the whole of the colon, but w deepest in the ascending colon and in the sigmoid flexu The *rectum* and *anus* were but slightly congested. T contents of the large intestines were generally normal, b some parts of it contained only whitish mucus.

Kidneys healthy. *Bladder* congested. *Uterus* co gested, both within and without. Lower part of *vagi* and *vulva* slightly congested.

The *blood* of this cow was generally fluid and da coloured.

The *udder* was congested. *Conjunctivæ* congested.

The *flesh* of the animal was healthy-looking, and th was no emphysema.

The *teats* and surface of the *udder* presented a we marked pustular (?) eruption.

Description of eruption.—The eruptions on the skin the three foregoing cows were absolutely identical; t spots in all three were of the same character, and had tained the same degree of advancement. The only d ference observed was that one of them presented perha rather fewer spots than the others; but the differen in this respect was very trivial. The spots consisted irregularly circular elevations, from about $\frac{1}{8}$ to $\frac{1}{4}$-inch diameter, but with not perfectly well defined margins; g nerally they were discrete, but occasionally two or three r into one another and formed a somewhat irregular patc

ch spot presented, on its most prominent part, a dirty-lowish or brownish scab, which had generally become rtially separated at the margins, and was easily re-ovable from the subjacent tissues. On removal it brought h it therefrom an opaque whitish soft layer, to which s usually attached a small circular lump, apparently of nilar material (but with the roots of a hair or two em-dded in it), which had penetrated into the substance of e true skin, to the depth of about ⅛ inch. The sur-e of the true skin, exposed by the removal of the bs, was in all cases deeply congested, but not ulce-ed. The margins of each diseased spot were made up efly of undermined epidermis, with a little exudation tween it and the true skin beneath, which latter, as in e more central portion, was congested. Vertical sections ays showed, sometimes one, sometimes several hairs, netrating the scabs, with their roots invested in some lammatory exudation, and beyond this exudation, with a rgin of congestion. The scabs consisted in part of dermic scales, in part of sebacious matter; and the per-seated layer consisted partly also of epidermic and acious matter, but chiefly of an aggregation of nuclear lies, which closely resembled pus corpuscles. They were, wever, more irregular in shape, and more imperfect in line than pus corpuscles usually are. The larger portion he material adhering to the roots of the hair was un-btedly the contents of the sebacious glands; but here was no greater or less abundance of pus-like cells. congested surface beneath presented a great abun-ce of minute blood-vessels full of blood, but no distinct entitious formations. There was no depression in the tre of the scabs, and there was no ulceration.—J. S. B.

) Bullock.—Albert Veterinary College.—Examined December 20, 1865. Died December 19.

he mucous membrane of the *nasal fossæ* was swollen deeply congested, especially behind; but there was no thous condition.

he *lips* and *gums* presented a few aphthous spots and oriations, with congestion of the subjacent membrane.

he *palate* was somewhat congested, especially behind, and studded with round or oval yellow, elevated, granular s, from about ⅛ inch in diameter downwards. These isted of thickened and softened epithelium, which could ily be removed, exposing a deeply congested area beneath. epithelium from the central parts of some of these patches already separated spontaneously. The papillæ covering internal surface of the cheeks, especially those near angles of the mouth, were generally deeply congested, their epithelial covering had become softened and in removed. This removal had taken place very irre-rly; sometimes a cap of epithelium had disappeared he apex of a papilla, sometimes a ring from its base, rom mid-way between the base and apex; but more rally the epithelium had come away in irregular flakes various parts of the surface. There was a slightly ular condition of the under surface of the tip of *tongue;* and at the base of the *tongue*, and on the rs of the *fauces* were scattered numerous roundish s, partly excoriations, partly accumulations of softened ular epithelium. There was deep congestion of the whole e *pharynx*. The *œsophagus* presented, in its upper a few small aphthous spots, but the greater part of its h was healthy.

rynx congested, and its mucous membrane tumid. *hea* congested in its whole length; and in its upper corresponding chiefly to the situation of the *trachéalis*), points of sub-mucous hæmorrhage; the tube contained d deal of frothy mucus.

onchial tubes only slightly congested and containing little secretion; some of the smaller ones, however, ng into tracts of carnified tissue, were filled with orm fluid.

ngs generally congested, the right one more par-rly; and both of them (but especially the left) nted large patches of non-crepitant carnified tissue. rgans were generally crepitant and presented patches aterlobular emphysema. *Pleuræ* and *pericardium* hy. *Heart* soft and flabby. The cavities contained coloured coagula. Their lining membrane was blood-ed, but there was no endocardial ecchymosis. There a good deal of emphysema in the mediastinum, and ed emphysema beneath the pericardium, about the of the heart.

ritoneum healthy. *Liver* pale and soft: *gall bladder* of healthy-looking bile. *Spleen* pulpy and slightly ant.

ntents of *rumen* and *reticulum* abundant and natural. mucous surface of the *rumen* presented several exten-racts of very decided congestion, the congestion being most intense in the papillæ; one or two considerable patches of equally intense congestion were observed in the *reticulum;* but there were no other morbid changes. The epithelium separated with great facility. Contents of *omasum* somewhat dry and caked. The vessels of the folds were generally well marked from the presence of blood in them; and in several of the folds there was mottled congestion—the mottlings being arranged along the branches of the injected vessels. Contents of the *abomasum* scanty, but not unnatural; the organ was much congested in the greater part of its extent, but presented no morbid change except this.

There was slight congestion of the lower part of the *rectum*, and again a little congestion in the ascending *colon*, and in the proximal portion of the *cæcum*. The lips of the *ileo-cæcal valve* were also congested; but the rest of the *large intestines* was almost uniformly pale. A large patch of *Peyer's glands* in the colon immediately adjoining the ileo-cæcal orifice, and another a yard or two down the intestine were deeply honey-combed, but there was no congestion, and evidently no recent morbid change.

The *small intestines*, with the exception of a congested patch about the middle of the jejunum, were pale throughout. *Peyer's patches* were honey-combed, but pale, and otherwise healthy. The contents of the bowels was a thin fluid, like rather dark-coloured pea-soup.

Kidneys, healthy. *Prepuce*, especially near its attachment to the glans, congested.

Brain somewhat congested, otherwise healthy.

Conjunctivæ congested.

Skin.—There was no eruption upon the scrotum nor on the integuments of the chin and neighbouring parts; but the neighbourhood of the anus and the buttocks presented abundant evidence of morbid changes. The surface was covered in large irregular patches by a greasy, yellowish, scab-like layer, varying in thickness, but having an average thickness perhaps of ordinary card-board, and presenting here and there points of increased and circumscribed elevation. This layer could readily be pulled off, leaving a deeply congested surface. There was no trace of cavities (such as the cavities of true eczematous or pustular eruptions) discernible; there was no space in fact between the layer above described and the congested surface of true skin on which it lay.

The *flesh* seemed healthy; and there was no general emphysema. Decomposition had set in.

Microscopical examination.—The patches of thickened epithelium, studding the roof of the mouth, were found to consist of epithelial cells, which had lost their mutual cohesion in great measure, and at the same time had become yellowish, plump, and refractive; in some instances they were granular. The contrast between these cells and those of the healthy mucous membrane around, which were scale-like and firmly united to one another, was very great. In the deeper parts of the patches, especially in the parts in contact with the true mucous membrane, there were numerous cell-like bodies of very various sizes and shapes, some of which were full of molecular matter, others contained largish oil-globules, and other irregular solid masses breaking, or broken, up into irregular segments. Here and there also were masses of small nuclear bodies, which had some resemblance to pus cells. Similar formations to those just described were seen in smaller quantities among even the more superficial of the epithelial cells. The capillary vessels of the true mucous membrane, corresponding to these patches, were dilated and full of blood. It was uncertain whether there was any sub-mucous extravasation. The papillæ within the angles of the mouth presented exactly the same appearances.

The greasy layer covering the true skin in the neighbourhood of the anus, consisted apparently of epidermic cells, (generally more or less granular) and of sebacious matter; and here and there (but more particularly in contact with the true skin) were groups and masses of small irregular nuclear bodies, somewhat resembling pus. These were partially dissolved by acetic acid, and left after the action of this reagent a group of molecules of various sizes behind. The surface of the true skin (which was no where ulcerated) presented abundance of capillaries distended with blood, but was apparently free from extravasation of blood.—J. S. B.

(31.) Cow.—Examined at Albert Veterinary College, December 22, 1865. Died on the 21st.

The epithelium covering the *lips* and *gums* was generally thickened, granular, and softened, and in a few places had become detached. The subjacent surface was more or less congested. These appearances were most marked in the gums and lip of the under jaw, and at the angles of the mouth. The papillæ in this latter situation were deeply congested and partly denuded, in irregular patches, of epi-

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thelium. At the right angle there was an excoriated surface of considerable extent, and this was bleeding.

The under surface of the *tip of the tongue* was in much the same condition as the lower lip; but the epithelium had become fissured in various directions and thus exhibited a kind of stellate arrangement of excoriations.

The *back of the tongue*, the *pillars of the fauces*, and the *soft palate* were all congested, and studded with small excoriations, and a greater or less quantity of thickened softened epithelium. The *pharynx* and the posterior half of the *hard palate* were similarly but much more slightly affected. The upper half of the *œsophagus* presented numerous minute circular spots, in which the epithelium was opaque, thick, and soft, and many small oval excoriations. These diminished in number from above downwards, and in the lower half of the tube none were detected.

The *larynx* was deeply congested throughout; and there were numerous hæmorrhagic points beneath its mucous membrane, especially beneath that part of it corresponding to the ring of the cricoid. There were, too, in this latter situation, small clots adhering to the surface, together with a film of puriform mucus. The *trachea* was deeply congested throughout, especially in the course of the trachealis muscle; and in the upper half, it presented numerous spots of sub-mucous hæmorrhage. It was lined with a layer of thick dirty-looking mucus mixed with minute clots of blood. The *trachealis muscle* in nearly its whole length was infiltrated with blood, and some of the intrinsic muscles of the larynx were similarly affected. The *bronchial tubes* were injected, and contained a good deal of bloody mucus and a few small clots. The *lungs* were congested (more especially the right), and both were generally crepitant. Both presented abundant interlobular emphysema throughout. The *pleuræ* and *pericardium* were healthy. The *heart* was flabby, and somewhat decomposed; its cavities contained soft coagula; and the musculi papillares of the left ventricle were greatly ecchymosed. The *bronchial glands* were somewhat congested.

Peritoneum healthy. The *liver* was pale and much decomposed, but apparently healthy. *Gall bladder* very large, and distended with very thin light-coloured bile. *Spleen* rather large and pulpy. The contents of the *rumen* were abundant and rather fluid. Its mucous membrane presented two or three tracts of deep congestion, but was otherwise healthy. The *reticulum* was healthy.

The *omasum* was full of hard caked contents which adhered to the surface of the folds, and on removal carried with them the epithelial lining. The larger vessels of the folds were congested; and most of the folds presented numerous irregular but well-defined patches of deep congestion (Plate IX.), arranged chiefly in the course of their vessels, and producing a marked mottled appearance. The papillæ in most of these patches were congested, as well as the surface between them. In some cases the papillæ alone were congested.

The contents of the *abomasum* were very fluid. The organ itself was deeply congested throughout and presented a few hæmorrhagic spots, and a few spots of abrasion.

The lower part of the *rectum* was deeply congested, and the margins of the *anus* were somewhat aphthous; but the rest of the *rectum* and the greater part of the *colon* were healthy, and their contents were nearly healthy. The *cœcum*, however, and still more the *ascending colon*, were decidedly, though not very deeply, congested; and their contents were blood-stained. The *duodenum* presented numerous points of sub-mucous hæmorrhage. In the *jejunum* were several tracts of very intense congestion, in which the mucous membrane was reduced to a pulp; and the mucous membrane of nearly the whole of the *ileum* was in the same condition. The contents of the small intestines were fluid, and in the lower part of the ileum blood-stained. The *uterus* was somewhat congested within; and the *vagina* was rather deeply congested in its whole extent, especially near the *vulva*, the margins of which latter were very distinctly aphthous. *Kidneys* congested and soft. The *urinary bladder* was somewhat congested, and presented a distinct spot of sub-mucous hæmorrhage. *Urethra* deeply congested.

The *flesh* of this cow seemed healthy; and there was no general emphysema, and none in the lumbar region. *Udder* congested.

There was an abundant rash observed (Plates I. and II.), particularly on the *teats* and *udder*, on the skin in the neighbourhood of the *anus* and *vulva*, and on that of the *chin*. I examined this carefully, and found it everywhere of the same character; but the following description is drawn chiefly from the eruption on the teats and udder.

The eruption consisted of spots from about half a line to a quarter of an inch in diameter, and of irregular patches of still larger size, formed apparently by the coalescence of several contiguous spots. The more minute spots formed convex elevations; and in some of them the more prominent portion consisted of a small solid scab-like lump which admitted of easy detachment or enucleation, leaving a pit, the bottom of which consisted of the congested surface of the subjacent true skin; but in some no such scab existed, the skin was continuous over the surface, and the sole morbid change discoverable (and that on which the elevation of the spot seemed alone to depend) was a circumscribed point of congestion and tumefaction in the substance of the true skin, sometimes occupying the surface only, sometimes extending vertically inwards to the depth of a line. In neither of the above cases could I detect between the epidermis and the true skin any fluid-holding cavity. In the latter case, indeed, nothing approaching to a cavity was ever recognized. The larger spots presented in every case a softish, greasy-feeling, yellowish-brown scab or crust, more or less irregular on the surface, varying from half a line in thickness downwards, easy to be removed from the subjacent surface, with an irregularly polygonal margin, more or less separated from the surrounding healthy epidermis—a thin lamina of which was always prolonged more or less onto the surface of the crust. The removal of the crust exposed the surface of the true skin, which was generally deeply congested in an area corresponding as nearly as possible with that of the superficial extent of the disease. There was no ulceration or other destruction of surface, and no accumulation of fluid on the surface of the true skin. Judging from the appearances presented by this case, it seemed to me that the disease began with a point-patch of congestion, and that over this congested spot some material was exuded (consisting partly of sebacious matter which primarily infiltrated the substance of the epidermis rendering it thick and soft and pulpy and otherwise abnormal, and subsequently (probably) tended to accumulate on the surface of the true skin.

Microscopical examination.—The red patches in the omasum were found to be caused by excessive congestion of the capillaries and other small vessels of the part, which by accumulation of blood within them were rendered distinct as though they had been artificially injected. (Plate XXIV. A.) No extravasation was recognized. The *crust* on the diseased patches of skin consisted partly of normal epidermic scales, partly of granular scales, partly of granular matter and oil globules, and partly of masses of minute nuclear bodies about the size of pus corpuscles. The latter seemed to me most abundant on the under surface. These bodies differed from ordinary pus corpuscles in the marked tendency they had to cohere into masses, in their less regular form, and in the fact that acetic acid reduced each of them merely to a minute aggregation of molecules. The congestion of the true skin was due chiefly if not entirely to distension with blood of capillary vessels.

Many of the internal organs were much decomposed.

J. S. B.

(32.) Cow.—Slaughtered during convalescence, December 22, 1865.—Albert Veterinary College.—Examined immediately after death.

The *mouth*, *pharynx*, *œsophagus*, and all parts connected therewith were perfectly healthy. There was no trace in the *gums*, or anywhere else, of congestion, excoriation, or any abnormal condition of the epithelium.

Larynx, *trachea*, and *bronchial tubes*, all healthy. The latter contained a good deal of frothy mucus. *Lungs* pale and crepitant throughout; no trace of emphysema. *Pleuræ* and *pericardium* healthy. The *heart* was contracted, and generally quite healthy. The apices of the papillary muscles in the left ventricle, however, were unusually dark, and presented traces of the extravasation of blood which had doubtless at one time existed there. The cavities contained a little fluid blood. It may be added here that the blood was lighter coloured than that of most animals dying of the cattle plague.

Peritoneum healthy. *Liver* quite healthy; *gall bladder* containing a small quantity of healthy bile. *Spleen* healthy. *Rumen* and *reticulum* and *omasum* all healthy, and containing natural contents. The contents of the *abomasum* were also natural, but presented a (normal) sour smell which I had not hitherto observed in the case of diseased animals. The mucous membrane was of a pinkish colour throughout, but chiefly in the situation of the folds. In the lower half of the organ were a small number of irregular polygonal shallow depressions, in which the mucous membrane itself was deficient (cicatrized ulcers resulting from the separation of sloughs?). The *small intestines* were healthy throughout, except that a few of the glands constituting Peyer's patches were enlarged to the size of a pea, and that the margins of the ileo-cœcal orifice were congested. *Large intestines*, *kidneys*, and other *urinary organs*, and *organs of generation* all healthy.

The *flesh* of the animal seemed healthy, but there was a deficiency of *fat*.

There were the remains (in the form of a greasy scab-like ayer) of an abundant eruption upon the skin of the neck, houlders, and some other parts.—J. S. B.

33.) Cow.—Examined December 27th, at Stronach's Horse Slaughtering Yard. Reported to have had disease severely for some time.

Both *upper* and *lower lips* were congested and abraded in pots and long streaks, especially near their junction with the gums. The *gums* were pale, and seemed healthy. The nder surface of the tip of the *tongue* was covered with hickened granular epithelium. The greater part of the pper surface of the organ was pale and healthy; but pos- erior to the circumvallate papillæ, the mucous surface was leeply congested, and there were numerous excoriations, ogether with intervening tracts of thickened and softened pithelium. At each side of the tongue, near its root, and mmediately in front of the epiglottis, were several oval, vell-defined, deep sloughy ulcers (from half an inch long lownwards). Shreds of sloughy tissue adhered to their dges and to their floors; and on vertical section those at the ides of the tongue were found to penetrate into the mus- ular substance of the organ. The *pillars of the fauces* and he *soft palate* were all deeply congested, and much in the ame condition as the base of the tongue. The *hard palate* as in an advanced state of disease (Plate V.); this was omparatively slight in the anterior half, but in the posterior alf was extreme. Throughout the anterior half (but in- reasing from before backwards) were numerous small spots om which the epithelial covering had disappeared; they ere generally round or roundish, varying perhaps from a uarter of an inch in diameter downwards. Some of these, owever, which involved the papillary border of the trans- erse ridges, were very irregular in form. In all these atches the subjacent mucous surface was deeply con- ested, and very generally portions of the epithelium imme- iately bounding the excoriated surface could be readily raped away. The orifices of many apparently healthy ucous glands were observed studding the whole sur- ce, and from each one a bead of transparent mucus ood out, having, at first glance, the appearance of being vesicle. Careful examination satisfied me that the nallest patches of excoriation were simply enlargements of e ducts of the glands, and that generally, if not always, ese ducts formed the centres from which the diseased tion radiated. In the posterior half of the palate there ere also visible numerous orifices of healthy glands, and nall circular excoriations, which seemed to have originated om such orifices; but the disease was mostly far advanced; e excoriated surfaces were generally individually larger, d had run into one another, forming large tracts of ex- riation, and leaving in many places isolated fragments of ill adherent epithelium. The excoriated surfaces in this uation were smooth and deeply congested; and from em (as from the healthy membrane) at numerous points ucus was escaping in beads into the oral cavity. In this ore diseased part of the palate, the still adherent epithe- m admitted generally of very easy removal; and there was ngestion of the mucous membrane extending even beyond e excoriations. *Pharynx and nasal cavities* deeply con- sted. *Œsophagus* healthy.

The *larynx* was deeply congested, and presented spots sub-mucous hæmorrhage. The surface of the *vocal ds*, and of the mucous membrane occupying the posterior gle of the larynx (bounded on either side by the arytenoid tilages) was granular, and appeared to be covered with a ad of granular exudation; this, however, could not be dily scraped away; indeed it seemed to be a part of the sue of the larynx, for on scraping it off the fibrous ucture of the cords was fully exposed. The *trachea* was ngested throughout, but mostly in the upper part, where re were numerous streaks of sub-mucous hæmorrhage. e *bronchial tubes* were congested, but more especially ose on the right side. The air-passages generally con- ned frothy mucus; but there was more in the bronchial oes than in the trachea. The *lungs* were everywhere cre- ant, and somewhat congested—the right most congested—— d both presented distinct interlobular emphysema. ere was abundant emphysema about the roots of the gs. *Pleuræ* healthy.

Pericardium healthy. *Heart* flabby, but healthy. No o-endocardial extravasation. The right ventricle con- ned a large black coagulum.

Peritoneum healthy. *Liver* perhaps a little congested. *ll-bladder* full of dark-coloured viscid bile. *Spleen* pale. *Rumen* and *reticulum* healthy. The contents of the *zsum* were dry; and the folds presented numerous cir- nscribed patches of congestion, the central parts of some which were becoming of a dirty yellowish or brownish . The *abomasum* was deeply congested throughout. resented many shallow excoriated pits, and a few small ughs of mucous membrane.

The *small intestines* presented a few tracts of not very deep congestion. The *cæcum* was studded, but not thickly, with patches of congestion. The *ascending colon* was in the same condition; but there were here also a few spots of sub-mucous hæmorrhage. The lower part of the *rectum* was deeply and uniformly congested; and a little above the anus there was a linear sloughy ulcer, about an inch and a half in length. The rest of the *large intestines* and the *anus* were healthy. The contents of the intestines were fluid and free from blood.

Kidneys healthy. *Bladder* full of pale urine; healthy. *Uterus* somewhat congested within. *Vagina* and *vulva* as nearly as possible healthy. The lower part of the vagina was slightly congested only.

The *skin of the udder* was covered with a copious im- petigo-like eruption. This occurred both as distinct spots and in confluent masses. It seemed to me most abundant at the base of the nipples and on the adjacent portion of the udder. The crusts were of a dirty yellowish or brownish colour, and were generally but slightly adherent to the sub- jacent surface. A vertical section through them failed to disclose any serum- or pus-holding cavity; but showed that generally the crusts were of uniform consistence in their whole thickness; it showed generally, too, that in the area of true skin corresponding to the centre of the crusts, there was a circular orifice with tumid congested lips, varying from one sixth of an inch downwards, by which the crust communicated with a group of sebacious glands, and occa- sionally with a hair-sheath as well. All these formed a solid mass continuous more or less distinctly with the crust; and the area of congestion in the true skin (over which the crust was situated) was reflected under, so as to enclose, this group. The orifices appeared to be simply the common mouths of these glands, and of the hair-sheaths, much dilated.

The animal was somewhat emaciated. There was no emphysema in the loins.

Microscopical examination.—On looking at the com- mencing excoriations in the palate, it was distinctly seen that those of them at least, which took their origin in the ducts of the mucous glands, commenced by a breaking up of the epithelial layer—the cells of which became more or less granular, and more or less yellowish and refractive, while the layer itself tended to split into horizontal layers. Sometimes this breaking down had led to the formation of a cavity in the thickness of the epithelium (Plate XXIII. c.); sometimes it had formed an irregular conical pit, wider at the free than at the attached surface (Plate XXIII. d.). In the already fully excoriated patches, it appeared to me that the papillæ were still remaining, wholly or in part, and that the portions of the gland-ducts opening upon the surface were normal.

The deep congestion of the *soft palate* was free, so far as I could observe, from extravasation.

The granular surface of the vocal *cords* consisted of epithelial scales (more or less granular), granular matter, and fragments of elastic and other tissues.

The patches on the *omasum* exhibited the usual fungus.

The sloughs of the *abomasum* displayed chiefly an abun- dant deposit of black pigmentary matter (in a purely granular condition), in the tissue between the tubules. (Plate XXIV. c.) It was very irregularly deposited, but tended to accumulate immediately around the walls of the tubules and upon the vessels. The tubules were generally nearly empty.

The crusts on the *skin* were made up chiefly of sebacious matter, but contained also epidermic scales, and masses of pus-like corpuscles. These latter seemed to me most abundant near the dilated mouths of the sebacious glands, and on the superficial portions of the crusts. At all events, they were scattered somewhat irregularly. The sebacious glands appeared to me to be enlarged, and their ducts un- usually full of contents.—J. S. B.

(34.) Heifer.—Examined at the Albert Veterinary College, January 13th, 1866.—Died night before.

There was considerable aphthous disease of *lips and gums*, with congestion and excoriation. The epithelium of the posterior half of the *palate* was more or less thickened and softened, and much of it came away readily. Roundish ex- coriated patches already existed at the time of examination. The disease was most advanced on the *soft palate*. The papillæ within the angles of the mouth were congested and partially excoriated. The under surface of the *tip of the tongue* presented a granular and thickened condition of the epithelium. The upper surface and sides of the *base of the tongue* and the *fauces* were congested, and covered more or less with altered and thickened epithelium, and presented here and there excoriated patches. There were numerous opaque yellow spots of altered epithelium in the lower part of the *pharynx*, and especially on the posterior part of the larynx.

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The *larynx* was congested and somewhat œdematous, and presented about the junction of the vocal cords anteriorly a few petechial spots. It was covered in part with a thin film of exudation; and at the posterior part, where the *arytenoid cartilages* were in contact, the surface was rough and evidently somewhat excoriated. The *trachea* was a good deal congested throughout, but presented no petechiæ. The lower half of the *trachealis muscle*, however, was infiltrated with blood. The tube contained a good deal of frothy secretion, and adhering to its walls a good deal of tenacious mucus. The *bronchial tubes* were a good deal congested, and contained much secretion like that observed in the trachea. The *lungs* were generally crepitant, but somewhat congested, and both of them presented distinct, but not far advanced, interlobular emphysema. *Pleuræ* healthy. *Pericardium* healthy. The *heart* had the appearance of being a little decomposed, but except that it was rather soft seemed healthy. There were no extravasations of blood into its tissue. It contained a moderate quantity of fluid blood.

Peritoneum healthy. *Liver*, *spleen*, and *pancreas* healthy. *Gall-bladder* full of bile. The *œsophagus* (Plate VI.) presented in its upper part slight congestion and a few opaque yellowish spots and streaks. *Rumen* and *reticulum* healthy; contents natural. *Omasum* healthy; contents not unusually dry. *Abomasum* generally but not very deeply congested. No petechiæ, sloughs, or excoriations. Contents very fluid. The *small intestines* presented numerous patches of not very deep congestion; contents fluid and pea-soup-like. The *cæcum* and ascending *colon*, both of them, presented rather deep congestion, occurring more or less in lines and irregular patches. The lower part of the *rectum* was uniformly and deeply congested (Plate XVI.). In the upper part the congestion was limited to a series of longitudinal streaks, which extended some way upwards into the colon. The rest of the *large intestines* was healthy.

Kidneys healthy. *Urinary bladder* healthy. The other organs were not examined.

The *flesh* of the animal seemed natural. There was no general emphysema. The *skin* presented but slight traces of eruption. The skin of the udder was slightly furfuraceous and that of the neck was covered more or less with a layer of yellowish exudation, which seemed to be composed of epidermis and of sebacious matter. I saw no isolated spot of disease.

Microscopic examination.—I discovered vast numbers of so-called "Rainey's bodies," in the muscles of the abdominal walls, in the deep muscles of the neck, in the tongue, and especially in the substance of the heart.—J. S. B.

(35.) Heifer.—Examined at the Albert Veterinary College, January 13th, 1866. Died immediately before.

There was slight aphthous condition of *lips* and *gums* and of *under surface of tip of tongue*. There was little congestion at the back of the mouth, but both on the *base of the tongue*, on the *pillars of the fauces*, and on the *soft palate* there were small excoriations and patches of thickened and softened epithelium. *Œsophagus* healthy. *Larnyx* and *trachea* pale and healthy. *Bronchial tubes* containing but little mucus. *Lungs* pale and crepitant, and free from emphysema. *Pleuræ* and *pericardium* healthy. *Heart* nearly empty; no sub-endocardial extravasations.

Peritoneum healthy. There was no evidence of disease in the *rumen*, *reticulum*, *omasum*, or *abomasum*. The *small intestines* presented occasional patches of not deep congestion. *The large intestines* were healthy throughout. There was no distinct congestion of either the *cœcum* or the *rectum*. *Liver*, *spleen*, and *pancreas*, apparently healthy. *Gall-bladder* full of thin bile. *Kidneys* healthy. *Bladder* healthy, containing urine. *Uterus* and *vagina* healthy.

The *flesh* of the animal seemed healthy. There was no general emphysema.

The *epidermis* covering the *udder* was slightly "branny," but I detected no other evidence of skin disease.

Microscopic examination.—The muscles of the *abdominal walls* and of the *neck*, the *tongue*, and the *heart* were all thickly studded with "Rainey's bodies."—J. S. B.

Details of Post-mortem Examinations of Sheep, Goats, and Deer.

(36.)—Sheep (Male).—Inoculated from Ox. Died, and examined, October 23d, 1865, at the Royal Veterinary College.

Lips, cavity of mouth, tongue, fauces, pharynx healthy throughout, with the exception that there were a few patches of adherent granular material on the root of tongue, immediately in front of the epiglottis.

The *larynx*, and the *trachea* in its whole extent, were deeply congested. The minute vessels in the latter organ were very distinct, and presented a beautiful penniform arrangement in the intervals between the cartilages. There were no extravasations of blood, and no adherent lymph or altered epithelium.

The left lung was congested throughout, and contained less air than natural, but was crepitant. *The right lung* was less congested than the left, but like it slightly though pretty uniformly crepitant. The anterior edge of its upper lobe was collapsed and partly carnified. There was no inter-lobular emphysema in either lung. *The bronchial tubes* were somewhat congested, and contained cylinders of coagulated blood, together with a sort of frothy sanguinolent fluid. This latter was most abundant on the right side. *Pleuræ* healthy.

Pericardium, healthy. The cavities of the *heart*, with the exception of the left ventricle, contained a large quantity of dark-coloured coagulum. The muscular tissue was firm and perfectly healthy. There were no sub-endocardial extravasations of blood.

Peritoneum healthy. *Liver* healthy. *Spleen* healthy, and so also the *kidneys*. None of these organs was noticeably softened or congested.

The *œsophagus* was pale and perfectly healthy.

The epithelial lining of the *rumen* came away very readily, and the mucous membrane beneath presented a faint pinkish tinge. The same description applies to the *reticulum*. The folds of the *omasum* were generally entirely healthy; a few of them, however, (two or three only) were very slightly congested at their free margins. The *abomasum* was somewhat congested throughout, but there were no patches intensely congested, and nothing approaching to inflammation. The mucous membrane was soft. The contents of the stomachs seemed pretty natural.

The *cæcum* was much more deeply congested than any of the above-named parts, and the congestion was of a patchy character, but there was no exudation or breach of surface. The mucous membrane came away somewhat more readily and was less tenacious, than natural. There were a few patches of congestion in the *small intestine*, and longitudinal bands of congestion, more or less marked, throughout the *large intestine*. *Peyer's patches* were healthy. *Anus* healthy. There was a tape worm in the small bowel.

The *urinary bladder* contained about a quarter of a pint of healthy urine, and its mucous membrane was pale and healthy.

The *flesh* of this sheep (including both muscle and fat) was perfectly healthy, both in colour and consistence.

There was no trace of emphysema of the areolar tissue, and no evidence anywhere of decomposition.—J. S. B.

(37.)—Sheep (Male).—Inoculated from Sheep. Died, and examined, October 23d, 1865. Royal Veterinary College.

Lips, cavity of mouth, tongue, fauces, and pharynx pale and quite healthy; mucous membrane of *larynx* slightly congested. The *trachea* presented patches of congestion like those described in the case of the former sheep. These began at the lower part of the upper fourth of the trachea, and continued (increasing in intensity) from that point downwards. In the upper part, the congestion occupied the anterior part of the trachea only; but below, it extended all round the tube, and was probably due, in great measure at least, to gravitation. There was no exudation on the surface. The trachea contained a little frothy fluid.

Lungs, congested, but crepitant (though sparingly so) throughout. The *bronchial tubes* contained a good deal of frothy sanguinolent fluid, and their mucous membrane throughout presented the same kind of congestion as was observed in the trachea; but it was greater in degree and more uniform than in that tube. There was a general tendency in the lung tissues to decomposition; but no interlobular emphysema. *Pleuræ* healthy.

Pericardium healthy, but containing a little blood-stained serum. All the cavities of *heart*, and the vessels leading therefrom, were full of dark-coloured clot. The muscular tissue of the organ was flabby; and the endocardium deeply bloodstained. The external surface also was bloodstained. The organ was beginning to decompose.

Peritoneum healthy. *Liver* pale, flabby, and soft, the vessels containing frothy blood. The organ was decomposed. *Spleen* of natural size, but soft and of dark colour.

The *œsophagus* was healthy. *Rumen* presenting in many parts a light pink tinge. Epithelium coming away readily. *Reticulum* and *omasum* in same condition. *Abomasum*, little congested, but nowhere (not even at the pylorus extremity) deeply congested, or presenting any appearance of inflammation. There was no ulceration or tendency to ulceration in any of the stomachs.

Cæcum presenting a few points of congestion, but generally healthy. The *intestines* were for the most part healthy; there was here and there a small patch of congestion, but no general congestion, and no ulceration. *Peyer's patches* were healthy. *Anus* healthy.

There was a tape worm in the small intestines.

Kidneys, congested and soft, but not unhealthy; the anges observed in them being due to decomposition.
Urinary bladder healthy.
Most of the congestion and softening in the above case as due to rapid decomposition: the *flesh* of the animal, owever, looked healthy, and did not appear to have shared preciably in the general decomposition. There was no mphysema of the tissues of the body.—J. S. B.

(38.) Sheep (Ewe).—Examined October 30th, 1865.
Royal Veterinary College.

The upper part of the *tongue*, in a space extending from e junction of its anterior and middle thirds to the circumllate papillæ, was studded with opaque yellow patches an irregularly roundish shape, in which the epithelium as thickened and softened, and from which it had in part parated. The mucous surface immediately beneath was nerally distinctly congested. A few similar patches were served on the corresponding portion of the *palate*. There re no further traces of disease in any part of the *oral vity* or in the *fauces*.
The *larynx* and *trachea* were healthy, as also were the *euræ*, *lungs*, and *bronchial tubes*.
Pericardium healthy. *Heart* also healthy, with the exption that there were abundant extravasations beneath e lining membrane of the left ventricle. The cavities ntained coloured clots.
Peritoneum healthy. *Œsophagus*, and *first three stomachs*, ite healthy. The *abomasum*, however, presented marked idences of disease. Its mucous surface was studded with tches of sub-mucous extravasation or of very deep ngestion. These were generally circular, or nearly so, d varied from a line to half-inch in diameter. Their our was mostly deep red, or even nearly black, but was t uniform; each patch presenting generally several ades, as though decolourization was in progress. Their rgins were generally well defined, even abrupt, and two three presented a distinct shallow groove in this situation; t there was in no instance actual ulceration. These ches formed three irregular groups of seven or eight h. The most important of these lay about midway ween the two orifices of the stomach; another lay a le above this; and the third not far from the pylorus. e *cæcum* presented a few bands and tracts of congestion; the remainder of the *intestines* (*both small and large*) as nearly as possible healthy. *Liver*, *spleen*, *kidneys*, *nary bladder*, *uterus*, *vagina*, &c., healthy.
The *flesh* of the sheep was in good condition. There s no emphysema.—J. S. B.

(39.) Sheep (Male).—Examined October 31st, 1865.
Royal Veterinary College.

Mouth, *tongue*, and *fauces* generally healthy. The posterior t of the tongue and the fauces were, however, a little re congested perhaps than usual; and in the former ation there was a thin layer of slightly adherent mucus. portion of *larynx* below the arytænoid cartilages was ier deeply congested; the rest of the organ was slightly gested. There was no deposit of lymph anywhere. The *hea* was congested in its whole extent, especially in the er part, but there was no extravasation beneath the ous membrane, and no exudation on the surface. The *hea* contained a good deal of coagulated blood and some us. *Both lungs* (but especially the right) were con-ed; and the latter presented several patches black with gestion, uncollapsed, and apparently apoplectic. They e sparely crepitant; the right one indeed, in the greater of its extent, contained no air. There was no pneuia. *The bronchial tubes* (especially those of the right lung) e bloodstained, but did not appear really congested. They ained a good deal of bloody mucus.
Veuræ and *pericardium* healthy.
he *heart* contained dark coloured blood in all its cavities, the lining membrane of the left ventricle was studded small extravasations. Heart otherwise healthy.
eritoneum healthy. *Liver* healthy. *Kidneys* healthy. *en* pulpy, but otherwise healthy.
Esophagus healthy.
ne *first three stomachs* were perfectly healthy.
ne *abomasum* was generally more congested than ral; and about its central part the surface was studded a few patches of congestion, a little more intense than of the surrounding surface.
ne *cæcum* presented a few spots of congestion, but was rwise healthy. *Anus* and *rectum* healthy.
her parts of *large intestines* and *small intestines* not ined.
ne body of the animal was in an early stage of deposition; but there was nothing particularly unhealthyng in the character of the *flesh*. There was no hysema.—J. S. B.

(40.) Sheep (Male).—Examined October 31st, 1865.
Royal Veterinary College.

Lips, *tongue*, *oral cavity*, *pharynx*, and *œsophagus* perfectly healthy. *Larynx* and *trachea* perfectly healthy. There was a little congestion in the course of the trachea, but not enough to indicate the presence of any disease.
Lungs (especially the right) somewhat congested, sparely crepitant, but otherwise healthy. *Bronchial tubes* healthy, and containing a little mucus. *Pleuræ* and *pericardium* healthy. Cavities of *heart* full of dark coloured clots; the heart itself was a little flabby. There were no sub-endocardial extravasations.
Peritoneum healthy. *Liver* somewhat pale, but otherwise healthy. *Spleen* rather pulpy, but of ordinary size, and healthy. *Kidneys* healthy. The *first three stomachs* were all free from congestion, and perfectly healthy.
The pyloric half of the *abomasum* presented numerous patches of congestion. These varied in shape and size, and ran into one another, forming in several cases irregular tracts of considerable extent. The congestion was deep, somewhat mottled, and pretty abruptly defined. The mucous membrane in some of these patches was thickened and elevated, and somewhat granular, and covered with a dirty greyish diphtheritic exudation which was soft, and came away readily in fragments. There was not much of this congestion immediately above the pylorus, the chief changes having occurred four or five inches above this orifice.
The *cæcum* was deeply congested in its whole extent, but was also studded thickly with patches of more intense congestion, which had a tendency to run together, and form an irregular kind of network. These patches were for the most part elevated, and covered with a soft granular exudation, resembling in fact in all respects those observed in the abomasum. *Anus* and *rectum* healthy.
The *small and large intestines* (excepting the parts above described) were not examined.
The *flesh* of the sheep was in good condition, and there was no emphysema.—J. S. B.

(41.) Sheep (Male).—Examined October 31st, 1865.
Royal Veterinary College.

Lips, *tongue*, *cavity of mouth*, *fauces*, and *pharynx* all healthy. *Larynx* and *trachea* healthy; the latter being, however, a little congested at its lowest part.
Pleuræ healthy. *Lungs* (especially right) rather congested, but otherwise healthy.
The *bronchial tubes* were somewhat congested, and loaded with a good deal of frothy mucus tinged with blood. *Pericardium* healthy. *Heart* soft, and somewhat decomposed; the left ventricle presented a few small sub-endocardial extravasations. All the cavities contained a little dark coloured clot. *Œsophagus* healthy.
Peritoneum healthy. The *stomachs* were apparently healthy. The epithelium, however, was very soft throughout; and the *abomasum* was uniformly a little more congested than usual.
The *cæcum* was somewhat congested, the congestion assuming a patchy character; but it was not very well marked, and the organ was in other respects healthy. *Anus* and *rectum* pretty healthy.
The *liver*, *spleen*, and *kidneys* were soft from decomposition, but not otherwise unhealthy.
The *small intestines*, and the remainder of the *large intestines*, were not opened for examination.
There was some general tendency to decomposition; but the *flesh* was nevertheless in fair condition. There was no emphysema.—J. S. B.

(42.) Sheep (Male).—Examined November 7th, 1865.
Royal Veterinary College.

Mouth, *fauces*, and *pharynx* altogether healthy. *Œsophagus* healthy. *Larynx* healthy. *Trachea* somewhat congested. The *bronchial tubes* contained a good deal of frothy mucus, but were healthy. *Lungs* somewhat congested, and sparely crepitant; otherwise healthy. *Pleuræ* healthy. *Pericardium* and *heart* healthy. The cavities of the latter contained black coagula. There were no petechiæ. *Peritoneum* healthy. *Liver* and *gall bladder* healthy. *Spleen* and *kidneys* also healthy. *Rumen* and *reticulum* perfectly healthy. *Abomasum* somewhat congested in patches, but not distinctly unhealthy.
A large number of the folds of the *omasum* were the seat of disease. The disease occupied the free edges exclusively. Sometimes a single patch existed in a fold, sometimes two. They occupied the edge to the extent of from ¼ inch to about an inch and a half, and extended thence into the folds to a depth of from half an inch to about an inch, presenting a somewhat sinuous and irregular, but abrupt, line of separation from the adjoining healthy portions of the fold. The patches consisted mostly of blackened gangrenous tissue, covered with a thick lumpy adherent deposit of dirty yellowish-brown material, which

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probably consisted in part of food, in part of epithelium mixed probably with other exudation from the mucous membrane. Some of these were breaking down and becoming separated. There was little or no congestion of the folds; but it seemed probable that the black discolouration, spoken of above, was, in part at least, the remains of congestion. Some of the least diseased patches had an ashy grey colour.

The *cæcum* was rather deeply congested, especially in patches, and in some of these the epithelium had become granular.

The *duodenum* and upper part of the *jejunum* were healthy, or nearly so. The lower part of the *jejunum* and upper part of the *ileum*, for a length of many yards, were studded thickly with deep red and black spots, circular, and from a line in diameter downwards. These studded indifferently the substance of the mucous membrane and the sub-mucous tissue. The lower four yards of the ileum were intensely congested, the mucous membrane being pulpy and deep red, and thickly marked with minute vessels. The contents of this portion of the bowel consisted almost entirely of decomposed blood, part of which was in the form of clots. The *ascending colon* was also considerably congested, but the rest of *the large intestines* was tolerably pale and apparently healthy.

The *flesh* and *fat* of this sheep were in good condition, and there was no emphysema.

Under the microscope the petechial spots in the small intestines were found to consist of injected vessels. The black spots were made up of rounded and irregular masses of black pigment.

The sloughing patches of the omasum presented large numbers of cells resembling pus cells, and much epithelium, more granular than that of the healthy parts of the folds. The tissues presented a brownish tint, more or less deep, according to the thickness of the mass examined. Probably this was due to some modification of the colouring matter of the blood, but no distinct blood elements were recognized. —J. S. B.

(43.) Sheep (Male) exposed to infection.—Examined November 21st, 1865. Royal Veterinary College.

The *lips*, *tongue*, *palate*, and rest of *oral cavity*, *fauces*, and *pharynx* were all perfectly healthy. *Larynx* healthy. The *trachea* contained a large quantity of frothy mucus; and along its anterior aspect, especially towards its lower part, the smaller vessels (chiefly between the tracheal rings) were much injected. *Pleuræ* healthy. *Lungs* somewhat congested, and containing very little air. The *bronchial tubes* were uncongested, but to their smallest ramifications were full of frothy fluid. *Pericardium* healthy; but there were a few petechial spots at the base of the heart. The *heart* itself was firm and healthy, and the cavities contained a little dark-coloured coagulum.

Peritoneum healthy. *Œsophagus* healthy. The contents of the *rumen* were rather fluid; and the mucous membrane presented in one or two places a pink blush; but in other respects both this and the *reticulum* were healthy.

The *omasum* was generally healthy; but the free edges of two of its folds, for a length of a quarter of an inch, and to a depth of half a line, were very distinctly congested, and slightly thickened.

The *abomasum* contained a good deal of almost fluid contents; its mucous membrane was generally somewhat pale, or presenting only faint diffused patches of congestion; but in addition to this, most of the folds were somewhat deeply congested, and the congested patches were either covered with a little adherent granular-looking lymph, or presented slight excoriation from the detachment of this lymph; the portions of folds most deeply congested were also thickened. The congestion varied in character, forming in some places irregular patches and rings of small size, which had coalesced more or less completely, in others forming nearly uniform tracts of some extent. The granular and excoriated condition was observed chiefly on the latter patches—the patches, that is to say, which were largest, and in which the morbid processes were most advanced. The same changes were observable, though in a somewhat less degree, in the intervals between the folds. The lower part of this stomach was nearly, if not quite healthy.

The *duodenum*, commencing at about a couple of inches from the pylorus, and for a distance of about half a foot, was much congested. The ramifications of the minute vessels were very distinct.

There were a few patches of congestion at the proximal extremity of the *cæcum*, and one or two in the *ascending colon*, but the rest of the *large intestines* was entirely healthy. The *small intestines* were healthy, except that they presented here and there arborescent patches of congestion.

The *liver* was pale, and somewhat mottled and indurated; and the ducts throughout the organ were hard and thickened.

The *spleen* was healthy. *Kidneys* rather large and unusually pale, especially in their cortical substance.

Urinary bladder healthy and empty.

Brain healthy.

The *flesh* of this sheep was perfectly healthy. There was no emphysema.—J. S. B.

(44.) Goat examined at the Albert Veterinary College, December 2d, 1865. Died November 29th, 1865.

There was no eruption about the *udder* or *teats*, or elsewhere on the *skin*. The *udder* contained a quantity of healthy-looking milk, which was healthy looking also under the microscope. The *flesh* of the animal looked healthy.

The interior of the *lips*, the *gums*, the *tongue*, and the rest of the *cavity of the mouth* and *fauces*, together with the *œsophagus*, were all healthy.

The *larynx and trachea* were a little congested, but on the whole healthy. The lower part of the trachea was the most decidedly congested part of the tube, and contained a considerable quantity of frothy mucus. The *lungs* contained very little air, and were somewhat congested, especially behind; in which latter situation were a few small carnified patches. In other respects the lung tissue was healthy. The *bronchial tubes* contained throughout a good deal of frothy mucus, but were themselves healthy-looking. The vessels of the lungs contained much coagulum. The *pleuræ* were healthy, with the exception that under the parietal pleura, on the upper part of the left side, there were some patches of extravasation.

The *pericardium* was healthy. The *heart* was firm, and both its auricles and the right ventricle were distended with dark-coloured coagulum. The left ventricle contained a small quantity of similar coagulum. There were some petechial spots at the base of the heart behind, but none in connexion with the endocardium.

Peritoneum healthy. The contents of the *rumen* and *reticulum* were somewhat dry and abundant, and the epithelium universally soft and easily detached. Some parts of the mucous membrane presented a faint pink tinge, but the organs seemed healthy. The *omasum* was perfectly healthy; the contents were soft. The folds of the *abomasum* were decidedly congested; and the congestion on and about some of them was markedly patchy. There was a little congestion also immediately above the pylorus. The contents were very fluid.

The *liver* was healthy; the *gall bladder* full of healthy looking bile. *Spleen* pulpy, but otherwise healthy. *Kidneys* congested, but healthy-looking.

The contents of the intestines, both large and small, were like thin pea soup. The *large intestines* were in the greater part of their extent healthy; but towards the lower part there were a few longitudinal reddish black streaks, corresponding to the prominences of the longitudinal folds; and throughout the ascending colon there were the same appearances in a somewhat more marked degree. The *cæcum* was very deeply congested; the congestion being intense and nearly uniform, towards its blind extremity, but becoming irregular and patchy towards its junction with the colon. The walls of the *cæcum* were somewhat thickened, and there were patches of congestion in connexion with the peritoneal surface of its free extremity.

There was an invagination of the cœcum within itself involving its free extremity only, to the extent of about two inches. This invagination was readily rectified; it evidently could not have existed long before death, nor could it have impeded in any way the passage of fæcal matter. It may, however, have increased, though it could not have entirely produced, the congestion which was discovered in the cœcum. I suspect it had no share in producing the symptoms under which the animal laboured; but was itself the result of some irregular action in the part, induced by pre-existing disease there. The margins of the *ileo-cæcal orifice* were very deeply congested.

At a distance of about a couple of inches from this point the colon presented a patch about an inch in diameter, and irregularly circular, in which the mucous membrane was blackened, presented a honeycomb appearance, and was studded on the surface with patches which looked like adherent lymph. About a foot lower down the intestine was a second patch, as nearly as possible identical with the in appearance.

The mucous membrane of the upper half of the *small intestines* was almost uniformly black. The blackness presented on close inspection a powdery appearance, and was evidently due to the presence of some pigmentary matter in the substance of the mucous membrane. The appearance diminished towards the lower part of the jejunum, and was wholly absent from the ileum. *Peyer's patches* were also blackened, but otherwise healthy.

There was deep congestion of the mucous membrane immediately inside the *anus*.

The *uterus* contained two fœtuses, probably about two months old. The uterus and its cotyledons were quite healthy. So also were the fœtuses.

The *vagina* seemed healthy, except that the os uteri and its neighbourhood were congested. *Urinary bladder* empty and healthy.

The *brain* was somewhat congested, especially on the surface and in the choroid plexuses, but was otherwise healthy. *Spinal cord* healthy.—J. S. B.

(45.) Kid. Aged 5 months.—Examined at the Albert Veterinary College. Dec. 3rd, 1865.

No appearance of rash about *teats* or elsewhere. *Flesh* healthy-looking.

Lips, gums, tongue, and *roof of mouth, fauces,* and *pharynx* healthy. *Larynx* and *trachea* and *bronchial tubes* healthy. No excess of mucus. *Lungs* crepitant generally; left more congested than right; and scattered on the surface of the lower lobe of this were a few small patches of carnification. *Pleuræ* healthy. *Pericardium* and *heart* healthy; no petechial spots. The cavities were full of dark-coloured coagulum.

Peritoneum healthy. *Œsophagus* healthy. *Rumen* and *reticulum* full of natural and rather dry food. Epithelium soft. Surface of mucous membrane somewhat pink. The *omasum* contained also rather dry food in moderate quantity, but was itself perfectly healthy. Epithelium soft. *Abomasum* pinkish, but healthy; contents mostly fluid. *Duodenum* and *jejunum* healthy-looking, but presenting occasional black pigmentary deposits, which tended in some parts to assume the shape of small rings. The *ileum* was uniformly and rather deeply congested, from its commencement to within a foot of the cœcum; but its walls were not thickened, and there was no appearance of any inflammatory change. *Peyer's patches* showed the congestion perhaps more markedly than other parts, but in other respects they were healthy.

The *ileo-cæcal* orifice in its whole circumference was tumid and almost black with congestion; and at one point was a small ulcerated patch, from which hung a shred of yellowish slough, about a quarter of an inch in length. The free extremity of the *cæcum* presented a few bands of congestion, but generally the organ was natural. At about an inch from the ileo-cœcal orifice, in the *ascending colon,* was an oval patch about ¾ inch in diameter, which seemed to be a Peyer's patch, but presented no marks of disease; and about a foot lower down the gut was an oval patch, about three-quarters of an inch by half an inch, in which the mucous membrane was partly tumid and deeply congested, partly excavated, and from which protruded a pulpy, yellowish, irregular slough, about a line in thickness. The rest of the *colon* was healthy. The termination of the *rectum,* immediately within the *anus,* was congested. The small intestines in their whole length contained a thin milky fluid, as also did the cœcum. The same kind of fluid in smaller quantity was observed in the large intestines. No solid fæces.

Liver and *spleen* quite healthy. *Gall bladder* distended with healthy bile. *Kidneys* and *supra-renal capsules* healthy. *Bladder* empty; quite healthy. *Uterus* healthy. *Vagina* much congested in the neighbourhood of the *vulva;* and round the margins of the orifice the epidermis was soft, flaky, and partly separated.

Under the microscope, the milky fluid in the intestines was found to contain an abundance of intestinal epithelium, in single cells and in flakes; but there was no evidence that it consisted of gruel, on which the animal had been latterly fed.

The pigmentary matter in the small intestines was found to consist chiefly of small scattered masses of black amorphous material.

The sloughs in the large intestine presented, besides traces of cellular tissue, numerous cells or nuclei, as nearly identical in their appearance as possible with pus-cells.—J. S. B.

Note.—The two goats, the post-mortems of which have been recorded above, were two out of several goats belonging to a cowkeeper at Islington. He had during the previous month or two lost about 30 cows by the cattle plague; and of these, 10 or 11 were new stock, which had been attacked and died quite recently, the last of the series having been removed from the shed on the 27th November. The goats had lived in the cowshed during the whole period of the prevalence of the cattle plague in it, and seemed to have enjoyed perfectly good health. But on the morning of the 29th, four of them seemed ailing, and did not take their food readily; in the afternoon they were decidedly worse, and refused all food. In the evening the goat died which was first examined. The others continued ill the next day, and then seemed to get better. The kid died rather suddenly on the morning of December 2nd.

Immediately after the last cow had been removed, all the dung and other offensive matters were taken away, the shed was purified, and chloride of lime was employed,—the goats remaining in the shed during the whole process. But they had undergone precisely the same ordeal on former occasions.—J. S. B.

(46.) Deer.—Examined, December 20th, 1865. Albert Veterinary College.

Mouth, fauces, and pharynx, and the parts connected therewith, quite healthy; except that the *tonsils* were enlarged, and full of tubercular matter. *Œsophagus* healthy. The posterior part of the *larynx,* and especially that below the arytænoid cartilages, was congested, and presented points and streaks of submucous extravasation. *Trachea* in its whole length deeply congested. *Bronchial tubes* also deeply congested. *Lungs* in an advanced state of tubercular disease. *Pleuræ* generally healthy, but presenting some adhesions. *Pericardium* healthy. *Heart* healthy; no endocardial ecchymoses; the right ventricle contained fibrinous coagula. *Bronchial glands* enlarged, and full of tubercular matter.

Peritoneum healthy. *Liver* congested, and rather firm. *Gall-bladder* full of bile. *Spleen* pulpy. *Rumen* and *reticulum* healthy; contents natural. *Omasum* healthy. The *abomasum* was but little congested, and the congestion was limited to the upper half of the organ; but throughout the remaining half were numerous irregular shallow depressions, to some of which blackish looking sloughs adhered. In some cases these sloughs still occupied the whole of the diseased patch; in others they had become partly detached. These exactly resembled the depressions and the sloughs frequently observed in the abomasum of oxen dead of the cattle plague. They were all, however, small; none measuring more than $\frac{1}{6}$ inch in diameter.

The *cæcum* and adjoining part of the colon were deeply congested, the congestion forming for the most part numerous longitudinal streaks. The remainder of the *large intestine,* including the *rectum,* was healthy. The *duodenum,* from the pyloric orifice, and the rest of *small intestines,* excepting only two or three short tracts, were uniformly and deeply congested; and the mucous membrane was reduced to a pulp, to the surface of which a quantity of bloody mucus adhered. Contents of small intestines fluid, and generally tinged with blood; those of the large intestines free from blood, and, except in the cœcum, scanty and tolerably natural.

Kidneys congested; healthy.

There was extensive tubercular disease of the *mesenteric glands;* but there were no tubercles in any of the abdominal viscera.

The *flesh* of the animal seemed healthy. There was no emphysema. No eruption was detected on any part of the *skin.*

Microscopical examination.—The sloughs in the abomasum were found to involve the whole thickness of the mucous membrane, which at the seat of sloughing had become much reduced in thickness (Plate XXV. c.) The sloughs themselves consisted in great measure of cylindrical bodies of a reddish-brown tint, which seemed made up of refractive angular masses. Few, if any, healthy tubules were discovered in the substance of the sloughs; but most of the cylindrical bodies above described occupied the situation of tubes, and evidently were tubes in an abnormal condition. None of these brownish cylinders gave any clear indication of epithelial contents. Some of them, however, contained in their interior small roundish bodies, which were probably more or less altered blood cells. I could not feel sure that the tubes in which these were discovered were not altered blood vessels. There was a good deal of black granular matter scattered irregularly about the tissues, in the intervals between the diseased follicles. The healthy tubules of the healthy mucous membrane were much larger in diameter than the cylinders which have just been described.—J. S. B.

Dr. Bristowe.

Report to Commissioners.

In this Tabular Form { (C.) in the upper left-hand corner of the top space means that the animal took the disease by *C*
(I.) " " " " " " " " *Inc*
× signifies that the organ or tissues against which it is placed *were found to be healthy.*

	Cow. (1.) C. 5 days ill. Died.	Cow. (2.) C. 6 days ill. Died.	Cow. (3.) C. 7 days ill. Died.	Bull. (4.) C. 6 days ill. Died.	Cow. (C. Ill over 4 day
Nervous System	—	—	—	—	—
Eyes	—	—	—	—	—
Nose	—	—	*Aphtha-like excoriation and congestion.*	—	—
Lips and Gums	*Aphtha-like spots*	×			×
Tongue	*Aphthous excoriations and congestion.*	×	*Aphthous excoriations and congestion.*	*Aphthous excoriation and congestion.*	*A few congeste tions at back.*
Palate		×			×
Pharynx		×			*A few congeste tions on pille*
Œsophagus	*Studded with linear excoriations.*	.. ..	×	×	×
Larynx	*Congestion, submucous extravasations, granular epithelium, hæmorrhage.*	*Tubercle of vocal cords:* otherwise ×	*Congestion, submucous extravasations, hæmorrhage:* lymph-like exudation.	*Intense congestion.*	*Deep congest mucous extra extravasatio cles of larym rhage, and exudation.*
Trachea	*Submucous hæmorrhage in spots.* Blood and mucus.	Slight congestion; a *few spots of congestion and extravasation.*	A little congested: an adherent film of exudation: *much frothy fluid.*	*Congestion and submucous hæmorrhage, hæmorrhage into trachealis.* Coagula.	*Congestion, hæmorrhage trachealis.* mucus in tul
Bronchial Tubes	*Submucous hæmorrhage in spots.* Much mucus.	*The larger ones spotted with congestion and submucous hæmorrhage.*	*Numerous hæmorrhagic spots, much frothy fluid, some mucus and blood.*	*Spots of submucous extravasation.* Clots of blood and mucus.	*Spots of subr travasation.* mucus in tul
Lungs	*Interlobular emphysema:* congested.	*Interlobular emphysema:* some collapse: *tubercle.*	*Interlobular emphysema,* congestion, some œdema.	*Interlobular emphysema:* congested, a little collapse.	*Interlobular* congestion, tion.
Pleuræ	×	×	×	×	×
Heart	*Hæmorrhage under lining of left ventricle:* otherwise ×	*Hæmorrhage under lining m. of left ventricle:* otherwise × : cavities with large clots.	*Hæmorrhage under lining membrane of left ventricle:* flabby.	*Hæmorrhage under lining membrane of left ventricle:* flabby.	*Hæmorrhage u membrane of cle.* Flabby partly clot, l
Pericardium	×	×	×	*Submucous petechiæ, and vibices over heart.*	*Subserous ex* at base of he
Blood Vessels	—	—	—	—	—
Blood	—	Coloured clots in anta and large vessels.	—	—	—
Lymphatics	—	*Bronchial glands congested.*	*Bronchial glands congested.*	—	—
Peritoneum	×	×	×	×	×
Liver	Pale, soft, ×. G. B. full of healthy bile.	Rather soft, ×. G. B. full of healthy bile.	Pale ×	Pale, soft ×. G. B. full of healthy bile.	Small ducts gall bladder bile.
Spleen	A little soft	Rather soft	×	Rather small and soft	×
Rumen and Reticulum.	× Contents abundant, soft.	*Numerous and large patches of tissue more or less advanced in sloughing:* contents ×. *M.*	×	× Contents natural.	Tracts of cons adhesion of to some o bands, cont
Omasum	A little diffused congestion: contents dry.	*Sloughing ulcers and perforations:* contents scanty. *M.*	*A few patches of circumscribed congestion* and sloughing.	× Natural contents.	× Contents nor
Abomasum	Congested, *with patches and spots of deeper congestion; healed excoriations:* fluid contents.	*Sloughy ulcers near pylorus and at edges of folds:* contents fluid.	Patches of congestion with deeply *congested points:* contents fluid.	× Contents fluid.	Some congest
Small Intestines	Tracts of slight congestion.	Congested here and there.	—	×	—
Cœcum	Somewhat congested	Congested	—	×	—
Colon	Somewhat congested	Somewhat congested	—	Longitudinal bands of congestion.	—
Rectum	Somewhat congested	Congested	*Intense congestion, with submucous extravasation.*	*Deep congestion, patches of submucous extravasation, prolapsus.*	Lower part c
Anus	Slight congestion	Congested		*Deeply congested.*	×
Contents of Bowels	—	—	—	—	—
Kidneys	×	×	—	×	One congeste One pale. ×
Bladder	×	× empty	—	× half a pint of urin	A few patch tion, a litt thra conges
Uterus and Ovaries.	Containing a slightly decomposed fœtus. ×	×	—	.. ..	×
Vagina	×	×	*Deeply congested, with patches of submucous extravasation* aphthæ of vulva.	.. ..	A little conge submucous tion on low
Vulva	Slight congestion	×		.. ..	A little conge
Male Organs	.. ..	.. ..	.. ..	—	..
Muscles	×	×	×	×	×
Cellular Tissue	*Emphysema in loins*	*Much emphysema, especially in loins.*	—	*Much emphysema, especially in mediastina.*	*Emphysema tina.*
Skin	—	—	—	—	—
Udder	—	—	—	.. ..	—
	.. ..	.. ..	.. ..	Somewhat decomposed.	Somewhat d
	Exd Oct. 20, R. V. C., a few hours after death.	Exd Oct. 21, R. V. C.	Exd Oct. 22, R. V. C.	Exd Oct. 23, R. V. C., a few hours after death.	Exd Oct. 24. I hours after

Signifies that the organ or tissues against which it is placed were *not examined.*
cs are meant to indicate *severity of disease.*
r *m* placed in the corner of any compartment refers to a written microscopical description.
} In this Tabular Form.

Dr. Bristowe.
Report to Commissioners

	Cow. (6.) C. 5 days ill. Died.	Cow. (7.) C. 5 days ill. Died.	Calf. (8.) C. 6 days ill. Died.	Bull. (9.) C. 5 days ill. Died.	Cow. (10.) C. 6 days ill. Died.
YSTEM -	—	—	—	—	—
- - -	—	—	—	—	Conjunctivæ congested.
- - -	—	—	—	—	—
UMS -	*Aphthous thickening of epithelium, and excoriation: slight congestion.*	*Aphthous thickening of epithelium, excoriation and congestion.*	Aphthous affection, with congestion and excoriation.	*Aphthous thickening of epithelium: excoriation and congestion.*	*Aphthous excoriations.*
- - -					*Congestion, excoriation, &c. at back.*
- - -					×
- - -					*Congested excoriations, &c.*
- -	*Epithelium granular in upper half.*	×	A little excoriation, &c. above.	×	Large bolus of food about orifice of larynx ×.
- - -	Very slight congestion, a film of exudation.	*Deep congestion: submucous hæmorrhage: hæmorrhage,* lymph-like exudation: *extravasation into muscles of larynx.*	Slightly congested: a little adherent exudation.	*Intense congestion: submucous hæmorrhage, and into muscles of larynx:* effusion of blood.	*Adherent film of lymph: congestion, and submucous hæmorrhage of every part: effusion of blood into muscles.*
- -	*Spotty congestion above:* general pink tinge: much frothy fluid.	*Deep congestion: submucous extravasation, and into trachealis.*	A little congested: much frothy fluid.	*Intense congestion: submucous hæmorrhage, and into trachealis:* effusion of blood and lymph.	*Deep congestion: submucous extravasation: hæmorrhage into trachealis.* Effusion of blood, &c. into trachea.
TUBES -	× A little frothy mucus.	Blood-stained only: a little thin serous fluid.	× A little frothy mucus.	.. ..	*Congested: submucous extravasation.* Mucus and blood in tubes.
- -	*Interlobular emphysema:* slight œdema.	A trace of interlobular emphysema: a little congested.	Sparely crepitant: carnified spots.	Crepitant, congested: slight emphysema.	*Interlobular emphysema:* congested.
- -	×	A little pleuritis in left.	×	×	Right lung attached by old adhesions.
- -	A little hæmorrhage under lining membrane of left ventricle: cavities empty.	Pale, flabby: cavities empty.	Flabby × - - -	Flabby: cavities full of black coagula.	Decomposed ×. Clots in all cavities.
d - -	×	*Recent pericarditis,* with *submucous hæmorrhage.*	×	×	×
ELS -	—	—	—	—	—
- -	—	—	—	—	Clots in all large vessels.
- -	—	—	—	—	—
- -	×	×	×	×	×
- -	× G. B. full of healthy bile.	Pale, containing a few fibrinous knots and many patches of cavernous tissue. G. B. full of healthy bile.	×	Decomposed, ×. G. B. full of healthy bile.	Decomposed, ×. G. B. full of healthy bile.
- -	×	Very pulpy - - -	×	Decomposed - - -	Decomposed.
				×	×
RETICU-	× Contents normal - -	× Contents normal - -	×	×	×
- -	*A few discs of congestion and commencing gangrene.*	*Discs of inflammation and gangrene* on two folds only: contents normal.	Slight diffused redness only. ×	×	Some diffused redness. ×
- -	*Patches of congestion: a few shallow sloughs:* contents ×.	*Numerous patches of congestion, and some of submucous extravasation:* contents natural.	Slight diffused redness -	×	Patches and spots of congestion.
TINES -	Patches of congestion -	—	Two or three tracts of congestion.	×	—
- -	*Congested at apex* - -	—	×	×	Somewhat congested.
- -	*Longitudinal bands of congestion.*	—	Longitudinal streaks of congestion.	×	—
- -	Congestion of prominent folds.	*Deeply congested: a longitudinal ulcer.*	×	*Deep congestion* - -	*Deeply congested.*
-	×	Scarcely reddened - -	×	×	×
BOWELS -	—	—	—	—	—
- -	×	×	×	Decomposed × - -	Decomposed.
- -	× empty - - - -	A single patch of congestion: much urine.	×	× Full of urine - - -	× Full of urine.
OVA-	×	.. ..	×	.. ..	×
- -	×	Lower part congested -	Slightly congested -	.. ..	*Lower part congested, with submucous extravasation.*
- -	Somewhat congested -	*Deeply congested: aphthous patches.*	Epithelium granular: slightly congested.	.. ..	*Congested, aphthous.*
- -	.. ..	.. ..	.. ..	—	.. ..
- -	×	×	×	×	×
SUE -	*Emphysema in mediastina and neck.*	No emphysema - -	No emphysema - -	*Emphysema about root of lungs, and in mediastina.*	*Emphysema in mediastinum and about kidneys.*
- -	—	—	—	—	—
- -	—	—	—	.. ..	Congested.
	.. ..	Decomposition.	.. ..	Much decomposed.	Much decomposed.
	Exd Oct. 26, R. V. C. Died evening before.	Exd Oct. 26, R. V. C. Died same day.	Exd Oct. 31, R. V. C.	Exd Oct. 31, R. V. C.	Exd Nov. 1, R. V. C.

Dr. Bristowe.

Report to Commissioners.

IN THIS TABULAR FORM { (C.) in the upper left-hand corner of the top space means that the animal took the disease by *Cont. Inocu.*
(I.) " " " " " "
(×) signifies that the organ or tissue against which it is placed *was found to be healthy.*

	Cow. (11.) C. 6 days ill. Died.	Cow. (12.) C. 7 days ill. Died.	Cow. (13.) Died.	Heifer. (14.) C. 5 days ill. Died.	Heifer. (15.) C. 5 days ill. Died.	Heif C. 4 days
Nervous System	—	—	—	—	—	
Eyes	—	—	—	—	—	
Nose	—	—	—	—	—	
Lips and Gums	*Aphthouse excoriations.*	*Aphthous thickening of epithelium, excoriation, and congestion.*	*Aphthous excoriations.* m. *Thickening and softening of epithelium, with congestion.* m.	*Aphthous thickening of epithelium, excoriation, and congestion.* m.	*Aphthous thickening of epithelium, excoriation, and congestion.*	*Aphth ing lium tion, tion.*
Tongue	*Congestion, excoriation, and thickening of epithelium.*					
Palate						
Pharynx						
Œsophagus	×	×	×	Upper part aphthous, lower part ×.	×	
Larynx	*Deep congestion: submucous extravasation, and into trachealis and laryngeal muscles. Blood and mucus in tubes.*	*Much congested: adherent exudation.*	Congested: lined with layer of exudation.	*Congested: spots of extravasation: adherent exudation;* early sloughing: small clots.	Congested	Slight c
Trachea		Congested: *many points of submucous hæmorrhage:* much frothy fluid.	Congested: much frothy mucus: *trachealis infiltrated.*	*Congested, spots of extravasation: trachealis infiltrated with blood:* much frothy mucus. m.	Congested: much frothy fluid.	*Lower gested. mucou tion, rrhage chealis*
Bronchial Tubes	—	Congested: *much frothy mucus.*	Congested: much frothy fluid.	*Congested: submucous extravasations:* sanguinolent mucus.	*Congested: submucous extravasation:* much frothy fluid.	*In righ ded rrhag contai and bl lung* ×
Lungs	Interlobular emphysema (?): much decomposed.	*Slight interlobular emphysema: cancerous tumours.*	Congested, carnified: no emphysema.	Congested, crepitant: *slight emphysema.*	Some congestion ×	*Interlol sema: peciall*
Pleuræ	×	Some adhesions	×	×	×	
Heart	Decomposed ×; some clots.	Decomposed: *extravasation under lining m. of left ventricle:* decomposing clots.	Flabby: clots in auricles: extravasation beneath lining m. of left ventricle.	Flabby: *extravasations under lining m. of left ventricle;* cavities nearly empty. M	*Extravasations under lining memb. of left ventricle;* a little blood in cavities.	Petechi lary m ventri
Pericardum	×	×	×	*Petechial spots* at base of heart.	×	
Blood Vessels	—	—	—	—	.. ..	
Blood	—	—	—	— m.	.. ..	
Lymphatics	—	—	—	—	.. ..	
Peritonæum	×	×	Congested	Congested	Congested	
Liver	Decomposed ×	× Gall bladder full of healthy bile.	Pale ×; gall bladder with a little thickish bile.	×	×	
Spleen	Decomposed ×	×	Soft ×	×	×	
Rumen and Reticulum.	—	—	*Patches of circumscribed congestion, with increased adhesion of epithelium:* contents ×: reticulum ×. m.	Rumen somewhat congested: reticulum ×.	Rumen congested in patches: reticulum ×.	
Omasum	—	Some diffused redness: *a few old perforations.*	*Numerous discs of congestion and early gangrene:* contents ×.	*Numerous discs of congestion.*	A little diffused redness.	Diffuse
Abomasum	—	Slight congestion about pylorus.	*Patches and points of congestion; shallow ulcers, some with adhering sloughs:* contents bloody.	*Deeply congested, numerous points of deeper congestion.* m.	*Congestion of lower third, excoriations and ulcers.*	*Deep points conges slough*
Small Intestines	—	—	*Deeply congested and bleeding.* m.	Points of congestion above: *deep congestion of ileum, with some hæmorrhage.*	*Intensely congested in lower parts.*	*Deep c peciall* slight
Cœcum	—	—	*Deeply congested*	*Deeply congested*	×	*Studde gested*
Colon	—	—	Ascending c. deeply congested: rest ×.	*Ascending colon deeply congested:* rest ×.	×	Linear
Rectum	—	—	*Congestion, chiefly of lower part.*	*Lower part deeply congested: submucous extravasation.*	*Lower part congested.*	*Deeply* especi
Anus	—	—	Congested	—	Congested	*Deeply*
Contents of Bowels	—	—	Blood and mucus in small intestines.	—	—	*Content intest*
Kidneys	Decomposed ×	×	×	×	×	
Bladder	—	—	×	×	×	Lining empty
Uterus and Ovaries	—	—	×	×	×	
Vagina	—	—	*Congested at lower part.*	*Lower part congested, with submucous extravasation.*	*Lower part congested.*	Lower
Vulva	—	—	*Congested, aphthous*	*Congested*	*Congested*	Congest *extrav*
Male Organs	.. ..	.. ..	.. ..	.. ..	.. ..	..
Muscles	×	×	× m.	×	×	
Cellular Tissue	No emphysema	No emphysema	No emphysema	No emphysema	No emphysema	No em cept a *terior mum.*
Skin	—	—	—	—	—	
Udder	—	—	—	—	—	
	Much decomposed	Much decomposed	.. ..	.. ..	.. ..	..
	Ex[d] Nov. 1, R. V. C.	Ex[d] Nov. 1, R. V. C.	Ex[d] Nov. 5, R. C. V.	Ex[d] Nov. 8, R. V. C.	Ex[d] Nov. 8, R. V. C.	Ex[d] Nov

ignifies that the organ or tissue against which it is placed *was not examined.*
are meant to indicate *severity of disease.*
n placed in the corner of any compartment refers to a written microscopical description.

} In this Tabular Form.

Dr. Bristowe.

Report to Commissioners.

	I. Calf. (17.) 5 days ill. Died.	C. Cow. (18.) 5 days ill. Died.	C. Cow. (19.) 7 days ill. Died.	C. Cow. (20.) 11 days ill. Died.	C. Cow. (21.) Slaughtered.
STEM -	—	—	Brain slightly congested	×	—
- -	—	—	—	—	—
- -	—	—	—	—	—
MS -	×	×		×	
- -	*Aphthous condition, with congestion.*	*Aphthous affection and congestion.*	*Aphthous thickening of epithelium, with excoriation and congestion.*	*Aphthous affection of epithelium, with congestion and excoriation.*	Slight aphthous condition.
- -		×			
- -		*Aphthous affection and congestion.*			
- -	×	×	First few inches aphthous.	×	×
- -	Pinkish - - - -	*Congestion, submucous extravasation,* hæmorrhage.	Some congestion with *submucous hæmorrhage: adherent exudation.*	*Sloughing, submucous hæmorrhage: clot of blood in rima.* M.	Slightly congested: adherent film of exudation.
- -	Pinkish, much frothy mucus.	*Congested, spots of extravasation; blood and mucus.*	*Congested, submucous hæmorrhage: blood* and mucus in trachea.	*Congested with some submucous hæmorrhage and into trachealis:* mucus.	Slightly congested, *a little submucous extravasation:* much mucus.
UBES -	Congested, much frothy mucus.	*Congestion, submucous hæmorrhage; blood in tubes.*	*Much submucous hæmorrhage, especially in smaller ones;* blood and mucus.	Congested, *submucous extravasation;* much mucus.	Congested points here and there: much mucus.
- -	Pale, crepitant, some patches of collapse.	No emphysema; *deep congestion.*	*Interlobular emphysema:* pale with some patches of collapse.	*Interlobular emphysema: pneumonia.*	*Interlobular emphysema:* pale.
- -	×	×	×	Subserous hæmorrhage at roots of lungs.	×
- -	×	*Sub-endocardial extravasation in left ventricle; clots and fluid blood in cavities.*	Subendocardial extravasation in left ventricle: fluid blood in cavities.	× Cavities full of coagula.	*Extravasations beneath lining m. of left ventricle:* empty.
- -	×	*Ecchymoses on posterior surface of heart.*	A few petechiæ at base of heart.	Ecchymoses on surface of heart.	×
S - -	—	—	—	—	—
- -	—	—	—	—	—
- -	—	—	—	—	—
- -	×	×	×	×	×
- -	×	× Gall bladder full of healthy bile.	*Large, indurated: walls of ducts thickened:* gall bladder full of healthy bile.	Ducts thickened, liver otherwise ×. Gall bladder full of bile.	× Gall bladder full of normal bile.
- -	×	×	×	×	×
ETICU-	×	*Rumen* slight congestion: reticulum ×.	×	×	× Contents ×.
- -	×	*Diffused tracts of congestion.*	Slight, apparently old, affection of edges of folds.	*Discs of congestion and of sloughing.* M.	*Congested discs,* caked contents. M.
-	*Congested in upper two-thirds.*	Generally congested: *two sloughy ulcers.* m.	Slight general congestion, numerous shallow ulcers.	Slightly congested, a small ulcer or two.	*Congested: numerous shallow ulcers, a few with sloughs.* M.
NES -	Lower part congested -	Slight congestion here and there.	×	*Intensely congested. Peyer's patches excoriated,* &c. M.	×
- -	*Two or three patches of congestion.*	Patches of congestion -	A few patches of slight congestion.	*Deeply congested* - -	*Patches of deep congestion and submucous hæmorrhage.*
- -	*A few patches of congestion in ascending colon.*	Patches of congestion in ascending colon.	×	Some congestion of ascending colon.	*Patches of deep congestion and submucous hæmorrhage* of ascending colon.
- -	*Congested in lower part*	*Deeply congested, especially below.*	Deep congestion, especially below.	*Deep congestion,* especially below.	Pale.
- -	*Congested* - - -	*Congested* - - -	Deep congestion - -	Congested - - - -	×
OWELS	Clay-coloured and fluid.	Thin yellowish milky fluid.	.. ..	Bloody mucus in small intestines.	Fluid in greater part of bowels, natural in rectum.
- -	×	×	×	A few patches of congestion on surface, otherwise ×.	×
- -	× Full of urine.	×	Slight submucous hæmorrhage: empty.	Slightly congested: empty	—
ARIES	×	Enlargement of uterus, cavity full of bloody fluid: chronic disease?	Uterus enlarged - -	Containing a decomposing fœtus.	—
- -	Congested above and below.	*Lower part congested* -	Deeply congested below -	×	×
- -	Congested - - -	Congested, *epithelium granular.*	Congested, mucous membrane granular and excoriated.	Slightly congested - -	Slight congestion.
- -	.. ..	.. ..	.. ..	.. ..	.. ..
	×	×	×	×	×
TE -	No emphysema - -	No emphysema - -	*Emphysema of mediastina.*	*Abundant emphysema of mediastina, and about the kidneys.*	*Emphysema of mediastina, and about kidneys.*
- -	—	—	No eruption - - -	*Scabby eruptions about teats and udder.* m.	—
- -	—	—	Congested, much milk	—	—
	Exd Nov. 9, R. V. C.	Exd Nov. 9, R. V. C.	Exd Nov. 10, R. V. C.	Exd Nov. 21, R. V. C.	Exd Dec. 4, CattleMarket.

Dr. Bristowe.
Report to Commissioners.

IN THIS TABULAR FORM { (C.) In the upper left-hand corner of the top space means that the animal took the disease by *Contag. Inocula.*
(I.) " " " " " "
(×) signifies that the organ or tissue against which it is placed *was found to be healthy.*

	Cow. (22.) C. Slaughtered.	Bullock. (23.) C. Slaughtered.	Cow. (24.) C. Over 4 days ill. Died.	Heifer. (25.) I. 5 days ill. Died.	Heifer. (26.) I. 6 days ill. Died.	Cow. (27.) C. 9 days ill. Died.	C. 8 da
Nervous System	—	—	—	—	Somewhat congested	—	
Eyes	—	—	—	—	—	Congested	Conge
Nose	—	—	—	—	—	—	
Lips and Gums	Slight excoriation, &c.	*Slight aphthous condition only.*	*Slight aphthous condition with congestion, &c.*	*Aphthous condition, with congestion and excoriation.* M.	*Aphthous condition, with congestion and excoriation.* M.	*Aphthous affection, with congestion and excoriation.* M.	*Aphi tio ge co*
Tongue							
Palate	×						
Pharynx	×						
Œsophagus	×	—	×	*Hæmorrhagic points, and aphthous state of upper part:* aphtha of whole tube. M.	*Aphthous spots, especially above.*	A few aphthous spots above.	
Larynx	×	—	×	*Congestion with spots of sub-mucous extravasation: adherent exudation.* M.	*Congested:* adherent exudation.	*Much congestion, a few hæmorrhagic spots:* much mucopurulent exudation and frothy fluid.	*Muc wi rh mu an*
Trachea	Of a pinkish colour: much frothy mucus.	—	Slight congestion: *Hæmorrhagic points below:* much frothy fluid.	*Congested: points of extravasation:* much mucus.	*Congested;* much muco-purulent fluid		
Bronchial Tubes.	× Much frothy mucus.	—	A few congested points, much frothy fluid.	*Congested, with points of submucous extravasation:* much mucus.	*Slight congestion;* muco-purulent fluid: *some clots.*	*Congested: spots of hæmorrhage. Blood and mucus.*	*Conge rhag* muc
Lungs	*Slight interlobular emphysema.* A few hydatids.	—	*Interlobular emphysema:* congestion, collapse: some hydatid cysts.	*Slight emphysema:* congested.	*Slight emphysema and carnification;* congested.	*Slight emphysema,* congested.	*Much* cong
Pleuræ	×	—	×	×	×	×	
Heart	Congestion of apices of pap. muscles of left ventricle: empty.	—	*Hæmorrhage under lining m. of left ventricle.* Coagula in cavities.	*Hæmorrhage under lining* m. *of left ventricle.* ×	*Hæmorrhage under lining m. of left ventricle;* flabby, a little coagulum. M.	*Much ecchymosis of lining m. of left ventricle.* Flabby, decomposed, nearly empty.	*Ecchy ing vent* a litt
Pericardium	×	—	×	Petechiæ at base of heart, otherwise ×	Petecheal spots at base, otherwise ×	×	
Blood Vessels	—	—	—	—	—	—	
Blood	—	—	Partly fluid, partly coagulated in larger vessels.	— M.	—	Generally dark and fluid.	
Lymphatics	—	—	—	—	Bronchial and mesenteric somewhat congested.	—	
Peritonæum	×	—	×	×	×	A little congestion over great omentum, and over small intestines.	Conge sma
Liver	×	—	Some hydatids	×	Pale but ×. Gall bladder full of normal bile.	Firm, slightly cirrhosed; gall bladder full of healthy bile.	Pale; *ener* full
Spleen	×	—	×	×	×	×	
Rumen and Reticulum.	× Contents ×	—	× Contents ×	—	× Contents ×	*Congestion and sloughs.* M. Contents ×	
Omasum	A little diffused redness: caked contents.	—	A little diffused congestion: contents hard.	*Numerous congested spots:* contents caked.	× Contents ×	*Patches of congestion;* contents caked. M.	*Many gest begin* Conte
Abomasum	*Congested: numerous shallow ulcers.*	*Extreme patchy congestion and sub-mucous hæmorrhage. Effusion of blood into cavity.* M.	*Numerous sloughing ulcers.* M.	*Much congestion: hæmorrhagic points: excoriations.*	*Sloughs, excoriations, petechial spots.*	*Congestion, petechial spots, sloughs and ulcers.* Contents normal. M.	*Inten*
Small Intestines.	Slight congestion here and there.	—	Streaks of congestion here and there.	×	Congestion with (in duodenum) *sub-mucous extravasation.*	*Deep congestion of duodenum and jejunum;* m.m. pulpy. Ileum ×	*Inten* m. pul
Cœcum	*Patches of congestion and sub-mucous hæmorrhage.* M.	—	*Deep congestion with sub-mucous hæmorrhage and escape of blood into bowel.* m.	A few points of congestion.	Congestion of extremity and of valve.	Little congestion	*Deep*
Colon	*Patches of congestion and sub-mucous hæmorrhage in ascending colon.* M.	—	*Deep congestion and submucous hæmorrhage,* chiefly in ascending colon. M.	Congestion of ascending colon.	Congestion in ascending colon. Honeycombed condition of Peyer's glands.	Ascending colon rather congested.	*Deep asce*
Rectum	×	—	*Deep congestion of lower part.*	*Congested*	Congestion; *submucous hæmorrhage.*	*Intense congestion*	
Anus	×	—	—	*Congested*	×	*Intense congestion*	
Contents of Bowels.	Contents of small intestines like dirty pea-soup.	—	Contents of large intestines pretty solid, but containing a little blood.	Contents of rectum bloody.	Contents like pea-soup.	Like dirty pea-soup generally.	Fluid
Kidneys	×	—	×	×	×	×	Conge
Bladder	—	—	× Nearly empty.	—	*Congested;* some urine. Congestion, with sub-mucous extravasation of urethra.	×	
Uterus and Ovaries.	—	.. ..	Containing a fœtus 2 months old. ×	—	Submucous hæmorrhage of neck, otherwise ×	Congested externally and within.	
Vagina	×	.. ..	×	*Congested below*	*Congestion of lower half, with hæmorrhagic points.* M.	*Lower half deeply congested.*	
Vulva	Slight congestion.	.. ..	Slightly congested	*Congested*	*Congested, aphthous.*	*Deeply congested.*	
Male Organs	.. ..	—	.. ..	.. ..	.. ..	.. ..	
Muscles	×	—	×	×	×	×	
Cellular Tissue.	*Emphysema in mediastina and lumbar region.*	—	*Emphysema in mediastina.*	No general emphysema.	No emphysema	No general emphysema.	*Empl kidn aste*
Skin	—	—	—	—	Skin of udder and teats furfuraceous and rosy.	*Impetigo-like eruption on udder and teats.*	*Impe tion teats*
Udder	—	.. ..	—	—	—	Congested, containing some milk.	Conge
						Much decomposed.	Much
	Exd Dec. 4, Cattle Market.	Exd Dec. 4, Cattle Market.	Exd Dec. 4, R. V. C.	Exd Dec, 15, R. V. C.	Exd Dec. 17, R. V. C.	Exd Dec. 18, Col. Talbot.	Exd

nifies that the organ or tissue against which it is placed *was not examined.*
e meant to indicate *severity of disease.*
placed in the corner of any compartment refers to a written microscopical description.

} In this Tabular Form.

Dr. Bristowe.

Report to Commissioners.

	Cow. (29.) C. 3 days ill (?) Died.	Bullock. (30.) C. 6 days ill. Died.	Cow. (31.) C. 6 days ill. Died.	Cow. (32.) I. Convalescent. Slaughtered.	Cow. (33.) C. Died.	Heifer. (34.) C. 6 days ill. Died.	Heifer. (35.) C. 6 days ill. Died.
EM	—	Somewhat congested	—	—	—	—	—
-	Congested -	*Congested* - -	Congested - -	×	—	—	—
-	—	*Deeply congested, tumid.*	—	—	—	—	—
13			*Aphthous affection and excoriation,*	×			
-			*Aphthous affection of tip and base.*	×			
-	*Slight aphthous affection, with congestion and excoriation.*	*Aphthous affection, with congestion and excoriation.* M.	*Aphthous condition of posterior part.*	×	*Aphthous condition, congestion, excoriation, &c., sloughing ulcers on tongue.* M.	*Aphthous condition, congestion, excoriation, &c.*	*Slight, but very distinct aphthous condition, with slight congestion and excoriation.*
-			*Congested, slight aphthous condition.*	×			
-	×	Slight aphthous condition of upper part.	*Aphthæ in upper half.*	×	×	Some aphthous spots.	×
-	Slightly congested -	*Congested* - -	*Deep congestion, submucous hæmorrhage, slight hæmorrhage.*	×	*Congestion, submucous hæmorrhage, exudation on surface.*	*Congested: ædomatous:* petechial spots: *excoriation. Film of exudation.*	×
-		*Congested, a few spots of submucous hæmorrhage.*	*Deep congestion, spots of sub-mucous hæmorrhage and into trachealis;* blood and mucus.	×	*Congested, some submucous hæmorrhage.*	*Congested: trachealis infiltrated: much secretion.*	×
-	Slightly congested: little secretion.	Slightly congested, little secretion.	*Deep congestion,* frothy mucus and clots.	Much frothy fluid.	Congested - -	Congested: much secretion.	×
-	Slightly congested; *slight emphysema.*	Congested, somewhat carnified: *slight emphysema.*	Congested, *much interlobular emphysema.*	×	Crepitant, not congested, *emphysema.*	Slight emphysema. Slight congestion.	×
-	×	×	×	×	×	×	×
-	*Hæmorrhage under lining m. of left ventricle;* nearly empty.	Soft flabby; dark clots in cavities.	*Hæmorrhage under lining m. of left ventricle:* soft clots in cavities.	*Traces of hæmorrhage in musc. pap. of left ventricle.* ×	×	Some fluid blood.	×
-	×	×	×	×	×	×	×
3	—	—	—	—	—	—	—
-	Generally dark and fluid.	—	Partly fluid, partly coagulated.	×	—	—	—
-	—	—	Bronchial glands rather congested.	—	—	—	—
-	Small patches of congestion.	×	×	×	×	×	×
-	Pale; *ducts thickened:* gall bladder full of pale bile.	Pale, soft; gall bladder full of normal bile.	Pale, soft; gall bladder distended with thin bile.	× Gall bladder not distended.	× Gall bladder full of dark bile.	× G. B. full of bile.	×
-	×	Pulpy, decomposed -	Pulpy - - -	×	×	×	×
3	*Irregular patches of congestion in rumen.* Contents ×	*Patches of congestion in rumen and reticulum;* contents ×	*Patches of congestion in rumen* contents ×	×	×	×	×
-	*Patches of congestion.* Contents ×	*Patchy congestion.* Contents dry.	*Much patchy congestion:* contents dry. M.	×	*Slight congestion with commencing sloughs.*	× Contents normal.	×
-	*Much congested, numerous petechial spots; a few excoriations;* contents ×	*Much congested* -	*Congested, spots of submucous hæmorrhage, excoriations:* contents fluid.	*Excoriations in lower half.*	*Much congested, cicatrices, sloughing ulcers.* M.	Slight congestion -	×
3	Some congestion throughout.	Peyer's patches honeycombed.	*Intense congestion and pulpy softening of m. m.*	×	Slight congestion -	Patches of slight congestion.	Patches of congestion.
-	*Congestion in patches*	Somewhat congested	Congested - -	*Lips of ileo-cæcal orifice congested;* otherwise ×	Patches of congestion	Congestion in lines	×
-	*Bands of congestion* -	Congestion of ascending colon.	*Ascending colon congested.*	×	Patches of congestion	Congestion in lines along ascending colon.	×
-	Scarcely any congestion.	Lower part congested	*Lower part congested.*	×	*Deeply congested below: a sloughing ulcer.*	*Deep congestion* -	×
-	Scarcely any congestion.	×	*Slightly aphthous* -	×	×	×	×
F	Natural - - -	Like thin pea-soup -	Mixed with blood in ileum and cœcum.	×	Fluid - - -	Pea-soup like.	..
-	×	×	×	×	×	×	×
-	Congested - -	—	Congested: a spot of submucous hæmorrhage.	×	× Full of urine - -	×	× Containing urine.
D	Uterus congested -	.. ..	Uterus a little congested.	×	×	—	×
-	Lower part slightly congested	.. ..	*Much congested* -	×	Very slight congestion.	—	×
-	Slightly congested -	.. ..	*Congested, aphthous.*	.. ×	×	—	×
-	.. ..	*m.m. of prepuce congested.*	.. ..	.. ..	.. ..	.. ..	.. ..
-	×	×	×	×	—	Numerous "Rainey's" bodies. M.	Numerous "Rainey's" bodies. M.
-	No general emphysema.	*Emphysema of mediastinum.*	× No emphysema.	× Little fat.	No general emphysema.	No emphysema -	No emphysema.
-	*Impetigo-like eruption on udder and teats.* M.	*Congestion of, and exudation upon skin of buttock.* M.	*Impetigo-like eruption.* M.	*Much scabby eruption on neck and back.*	*Copious eruption.* M.	Sebaceous exudation on neck only.	Furfuraceous condition.
-	Congested - -	.. ..	Congested - - -	—	—	—	—
		Decomposed.	Decomposed.				
	Ex^d Dec. 18. Col. Talbot.	Ex^d Dec. 20, A. V. C.	Ex^d Dec. 22, A. V. C.	Ex^d Dec. 22, A. V. C.	Ex^d Dec. 27, at Stronach's.	Ex^d Jan. 13, A.V.C.	Ex^d Jan. 13, A. V. C.

Dr. Bristowe.

Report to Commissioners.

In this Tabular Form { (C.) in the upper left-hand corner of the top space means that the animal took the disease by *Cont* / (I.) " " " " " *Inocu* / (×) signifies that the organ or tissue against which it is placed *was found to be healthy.*

	Sheep. (36.) I. 3 days ill. Died.	Sheep. (37.) I. 3 days ill. Died.	Sheep. (38.) I. 11 days ill. Died.	Sheep. (39.) Died.	Sheep. (40.) C. 6 days ill. Died.	She C. 6 days
Nervous System	—	—	—	—	—	
Eyes	—	—	—	—	—	
Nose	—	—	—	—	—	
Lips and Gums	×	×	×	×	×	
Tongue	Few granular spots at root.	×	Aphtha-like spots.	Back part slightly congested.	×	
Palate	×	×	Aphtha-like spots.	×	×	
Pharynx	×	×	×	Very slight congestion.	×	
Œsophagus	×	×	×	×	×	
Larynx	*Congested.*	Slight congestion.	×	*Congestion, especially below.*	×	
Trachea	*Congested.*	*Congested;* a little frothy fluid.	×	Congested; much coagulum and some mucus.	×	Very s gested
Bronchial Tubes	Congested; containing clots.	*Congested;* frothy sanguinolent fluid.	×	Blood stained; much bloody mucus.	× A little mucus.	Congest frothy
Lungs	Congested; some collapse.	Congested.	×	*Congested;* some *pulmonary apoplexy.*	Congested.	Co
Pleuræ	×	×	×	×	×	
Heart	× Cavities full of coagulum.	× Cavities full of coagula.	*Extravasations under lining membrane of left ventricle,* otherwise ×. Cavities full of coagula.	Extravasations under lining membrane of left ventricle, otherwise ×. Dark blood in all cavities.	Flabby × Full of dark clots.	Extrava der branc tricle
Pericardium	×	×	×	×	×	
Blood Vessels	—	—	—	—	—	
Blood	—	In large vessels coagulated.	—	—	—	
Lymphatics	—	—	—	—	—	
Peritoneum	×	×	×	×	×	
Liver	×	×	×	×	Pale. ×	
Spleen	×	×	×	×	Pulpy. ×	
Rumen and Reticulum.	×	×	×	×	×	
Omasum	Slight congestion at edges of folds.	×	×	×	×	
Abomasum	Somewhat congested; contents ×	Slightly congested.	*Sub-mucous congestion and extravasation; ulcers beginning.*	*Congestion in patches.*	*Congestion in patches; exudation on surface.*	Slightl
Small Intestines	A few patches of congestion. A tape worm.	Very slight congestion here and there. A tape worm.	×	—	—	
Cæcum	*Congested.*	A few spots of congestion.	*Patches of congestion.*	*Spots of congestion.*	*Congestion in patches; exudation on surface.*	Slight patch
Colon	Longitudinal bands of congestion.	Very slight congestion here and there.	×	—	—	
Rectum	Longitudinal bands of congestion.	Very slight congestion here and there.	×	×	×	
Anus	×	×	×	×	×	
Contents of Bowels	—	—	—	—	—	
Kidneys	×	×	×	×	×	
Bladder	× ¼ pint of urine.	×	×	—	—	
Uterus and Ovaries	.. ..	.. ..	×	.. ..	.. ..	..
Vagina	.. ..	.. ..	×	.. ..	.. ..	..
Vulva	.. ..	.. ..	×	.. ..	.. ..	..
Male Organs	—	—	.. ..	—	—	
Muscles	×	×	×	×	×	
Cellular Tissue	×	×	×	×	×	
Skin	—	—	—	—	—	
Udder	.. ..	.. ..	.. ..	.. ..	.. ..	..
	No decomposition.	Most of the viscera were soft from rapid decomposition. Many parts were blood-stained from same cause; and some of the blood contained bubbles of gas.	No decomposition.	Slight decomposition.		Organs rapid tion.
	Exd., Oct. 23, R.V.C., a few hours after death.	Exd., Oct. 23, R.V.C., a few hours after death.	Exd., Oct. 30, R.V.C.	Exd., Oct. 31, R.V.C.	Exd., Oct. 31, R.V.C.	Exd., Oc

gnifies that the organ or tissue against which it is placed *was not examined.*
are meant to indicate *severity of disease.*
placed in the corner of any compartment refers to a written microscopical description.

} In this Tabular Form.

Dr. Bristowe.
Report to Commissioners.

	Sheep. (42.) 3 days ill. Died.	Sheep. (43.) C. 4 days ill. Died.	Goat. (44.) C. 1 day ill (?). Died.	Kid, æt 5 months. (45.) C. 3 or 4 days ill. Died.	Deer. (46.) C. Died.
EM -	—	Brain. ×	Brain congested, cord ×	—	—
- -	—	—	—	—	—
- -	—	—	—	—	—
S - -	×	×	×	×	×
- -	×	×	×	×	×
- -	×	×	×	×	×
- -	×	×	×	×	*Tonsils tubercular*, otherwise ×
- -	×	×	×	×	×
- -	×	×	Slightly congested.	×	*Congested. Points of extravasation.*
- -	Slightly congested.	Somewhat congested; much frothy mucus.	Slightly congested; much frothy mucus.	×	*Deeply congested.*
BES -	× Much frothy mucus.	Full of frothy fluid.	× Much frothy mucus.	×	*Deeply congested.*
- -	Somewhat congested.	Congested.	Somewhat congested.	× A few carnified spots.	*Advanced phthisis.*
- -	×	×	Petechiæ at apex of left, otherwise ×	×	Some adhesions.
- -	×	×	×	×	×
	Black coagula in all cavities.	A little dark coloured clot.	Cavities full of coagulum.	Cavities full of coagulum.	Fibrinous coagulum, right ventricle.
- -	×	A few petechial spots at base.	Petechiæ at base of heart, otherwise ×	×	×
S -	—	—	—	—	—
- -	—	—	—	—	—
- -	—	—	—	—	*Bronchial and mesenteric glands tubercular.*
- -	×	×	Subserous hæmorrhage at apex of cæcum, otherwise ×	×	×
- -	×	Pale; indurated.	× G. B. full of healthy bile.	× G. B. full of healthy bile.	Congested and firm. G.B. full of bile.
- -	×	×	Pulpy.	×	Pulpy.
Reti-	×	×	×	×	×
			Contents dry.	Contents natural.	Contents. ×
- -	*Sloughing of folds.* M.	Slight circumscribed congestion of edges of folds.	× Contents soft.	× Contents dryish.	×
- -	Somewhat congested in patches.	*Patches of congestion, with exudation on surface, and excoriation.*	*Congestion*; contents fluid.	× Contents fluid.	*Sloughs and excoriations.* M.
NES -	*Deeply congested in lower part.* m.	*Deep congestion of duodenum.*	Upper half very black, otherwise ×	Ileum congested.	*Intense congestion and softening of mucous membrane.*
- -	*Congested in patches.*	A few patches of congestion.	*Patchy congestion*; invagination.	*Sloughy ulcer* at ileo-cæcal orifice; congestion of cæcum.	*Congested deeply.*
- -	*Congestion of ascending colon.*	A few patches of congestion in ascending colon.	Slight congestion. *Two sloughy excoriations.*	*Sloughy ulcer* in ascending colon. m.	*Deep congestion of ascending colon.*
- -	×	×	Slight congestion.	×	×
- -	×	×	Congested.	Congested.	×
OWELS	*Hæmorrhage into small intestines.*	—	Pea-soup like.	Like gruel. m.	In small intestines tinged with blood; in large, normal.
- -	×	Pale. ×	Congested.	×	Congested. ×
- -	—	× Empty.	Empty. ×	Empty. ×	—
WARIES	.. ..	.. ..	Two fœtuses, two months old; os uteri congested, otherwise ×	×	.. ..
- -	.. ..	.. ..	×	×	.. ..
- -	.. ..	.. ..	×	Congested. Epithelium granular.	.. ..
- -	—	—	.. ..	.. ..	—
- -	×	×	×	×	×
UE -	×	×	×	×	
- -	—	—	—	×	No rash.
- -	.. ..	.. ..	× *Healthy milk.* m.	—	.. ..
	Exd., Nov. 7, R.V.C.	Exd., Nov. 21, R.V.C.	Exd., Dec. 2, A.V.C., three days after death.	Exd., Dec. 3, A.V.C., one day after death.	Exd., Dec. 20, A.V.C.

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Description of Drawings on Plates I. to XXI, and XXVII, XXVIII.

Plate I.—Skin of the udder, showing eruption.

Plate II.—Skin of the perinæum, showing eruption.

Plate III.—Lips and gums, showing aphthous condition.

Plate IV.—Tongue and throat, showing thickening of epithelium with excoriation and congestion.

Plate V.—Roof of mouth, showing excoriations.

Plate VI.—Œsophagus with lower part of pharynx, showing aphthous condition.

Plate VII.—Smooth portion of rumen, or first stomach, showing sloughs in process of separation.

Plate VIII.—Papillary portion of rumen, or first stomach, showing sloughs.

Plate IX.—A fold of the omasum, or third stomach, showing patches of congestion.

Plate X.—A fold of the omasum, showing the formation of sloughs.

Plate XI.—A fold of the omasum, showing the separation of sloughs and cicatrization.

Plate XII.—Pyloric extremity of abomasum, or fourth stomach, showing congestion, with points of sub-mucous hæmorrhage.

Plate XIII.—Pyloric extremity of abomasum, showing sloughs.

Plate XIV.—A. Fold of abomasum, showing sloughs.
B. Pyloric extremity of abomasum, showing cicatrices.

Plate XV.—Duodenum, or commencement of small intestine, showing patches of sub-mucous hæmorrhage.

Plate XVI.—Rectum and anus, showing deep congestion

Plate XVII.—Larynx and trachea, showing congestion with sub-mucous hæmorrhage, and infiltration of tracheali muscle with blood.

Plate XVIII.—Larynx, showing slough of vocal cord and of the posterior angle.

Plate XIX.—Bronchial tubes, showing congestion and spots of sub-mucous hæmorrhage.

Plate XX.—Surface of lung, showing interlobular emphysema, extending in some places into the sub-pleural tissue.

Plate XXI.—Internal surface of left ventricle of heart showing patches of hæmorrhage beneath the lining membrane.

Plate XXVII.—Section of head of sheep affected with Cattle Plague.

Plate XXVIII.—Roof of mouth of sheep affected with Cattle Plague.

Descriptions of Plates XXII. *to* XXVI. *are on a separate sheet facing Plate* XXII.

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SKIN OF THE UDDER, SHEWING ERUPTION

PALL MALL

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SKIN OF THE PERINEUM; SHEWING ERUPTION.

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LIPS & GUMS, SHEWING APHTHOUS CONDITION.

H.B Tuson, del. Day & Son, Lithographers

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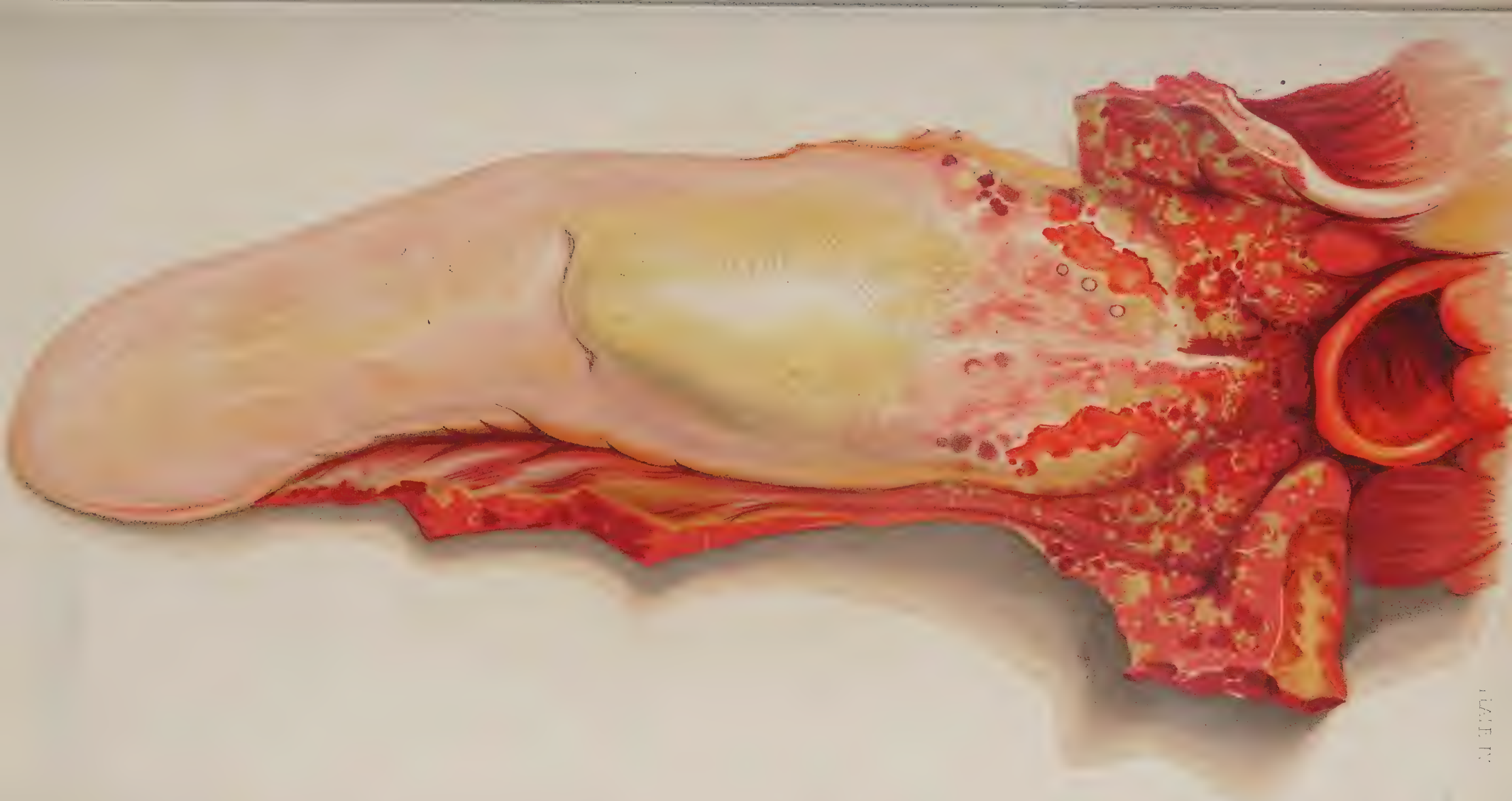

PLATE IV.

D^r J. S. Bristowe, Direx^t

TONGUE & THROAT, SHEWING THICKENING OF EPITHELIUM WITH EXCORIATION & CONGESTION.

H. B. Tuson, del. Day & Son Limited, Lith.

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ROOF OF MOUTH, SHEWING EXCORIATIONS.

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PHAGUS WI[illegible] CHEWING AP[illegible]

REFORM CLUB
PALL MALL

Dr J.S Bristowe, Dirext

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SMOOTH PORTION OF RUMEN, OR FIRST STOMACH; SHEWING SLOUGHS IN PROCESS OF SEPARATION.

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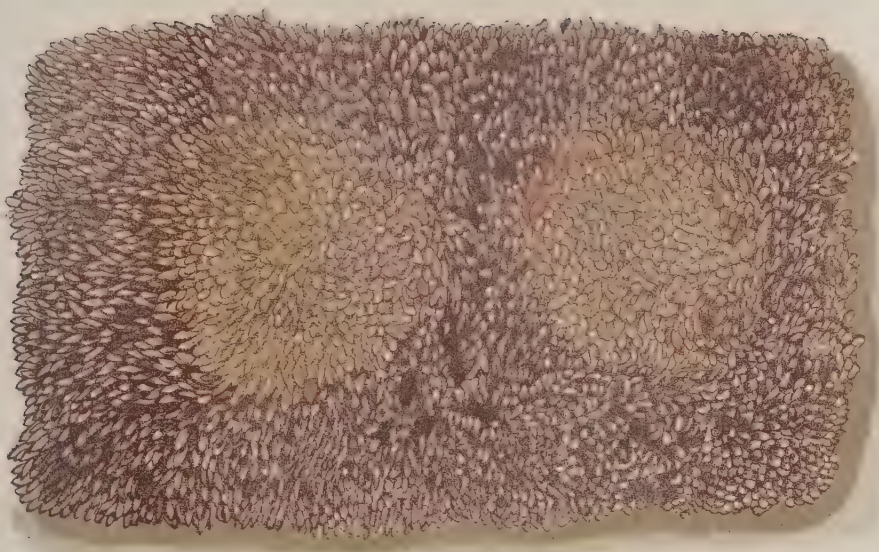

PAPILLARY PORTION OF RUMEN OR FIRST STOMACH, SHEWING SLOUGHS.

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ATHENÆUM CLUB
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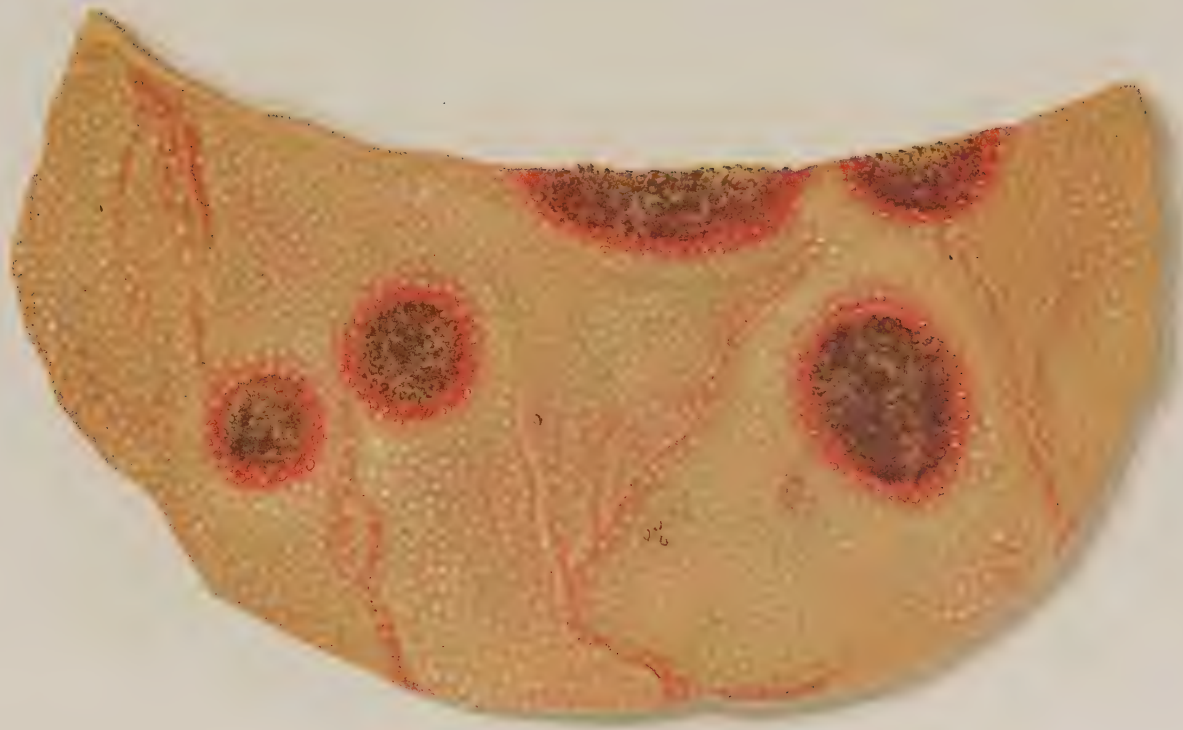
L.J.S. Bristowe, Direxit

A FOLD OF THE OMASUM OR THIRD STOMACH, SHEWING PATCHES OF CONGESTION

PALL MALL



A FOLD OF THE OMASUM, SHEWING THE FORMATION OF SLOUGHS.

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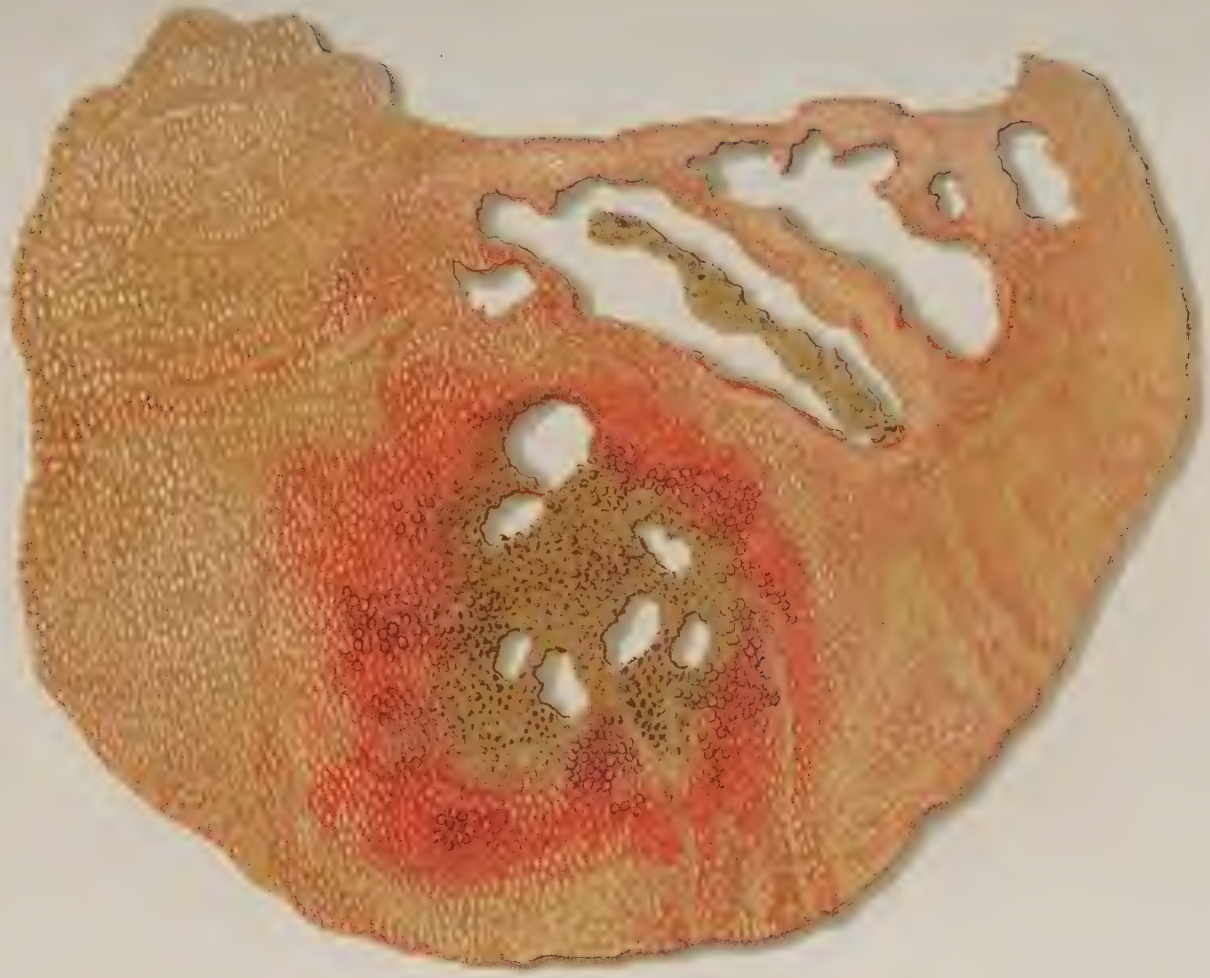

Bristowe, Direx.

A FOLD OF THE OMASUM, SHEWING THE SEPARATION OF SLOUGHS & CICATRIZATION.

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PLATE XII.

S. Bristowe Direx.

PYLORIC EXTREMITY OF ABOMASUM OR FOURTH STOMACH SHEWING CONGESTION WITH POINTS OF SUB MUCOUS HŒMORRHAGE

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Dr. J. S. Bristowe, Direx.

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PYLORIC EXTREMITY OF ABOMASUM SHEWING SLOUGHS.

PLATE XIII

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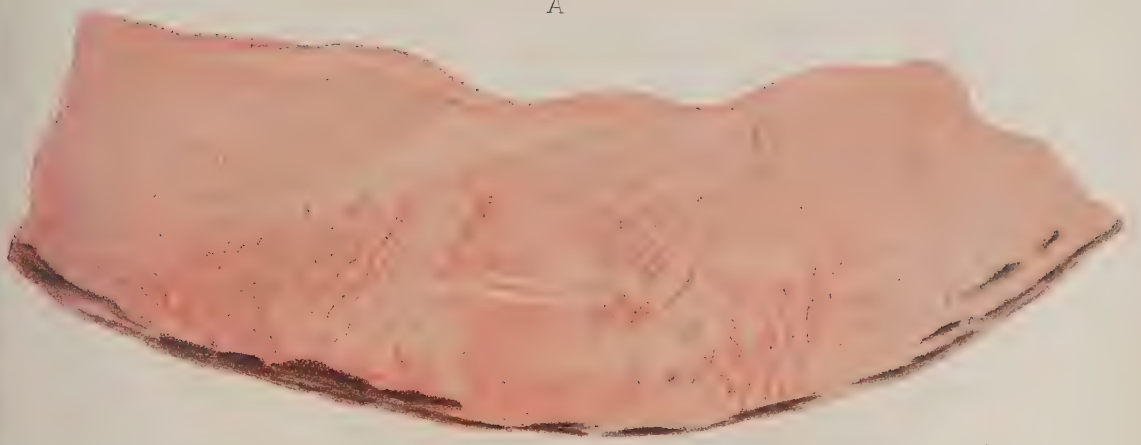
A



B

A. FOLD OF ABOMASUM, SHEWING SLOUCHS.
B. PYLORIC EXTREMITY OF ABOMASUM SHEWING CICATRICES.

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RECTUM & ANUS. SHEWING DEGREE OF CONGESTION

PALL MALL

LARYNX & TRACHEA, SHEWING CONGESTION WITH SUB MUCOUS HŒMORRHAGE
& INFILTRATION OF TRACHEALIS MUSCLE WITH BLOOD.

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LARYNX, SHEWING SLOUGH OF VOCAL CORD & IN THE POSTERIOR ANGLE

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PALL MALL

CHIAL TUBES, SHEWING CONGESTION & SPOTS OF SUB-MUCOUS HÆMORRHAGE.

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SURFACE OF LUNG, SHEWING INTERLOBULAR EMPHYSEMA, EXTENDING IN SOME PLACES INTO THE SUB-PLEURAL TISSUE

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PALL MALL

S. Bristowe, Dirext

INTERNAL SURFACE OF LEFT VENTRICLE OF HEART, S

GE BENEATH THE LINING MEMBRANE

H B Tuson del Day & Son Limited Lith.

Description of Drawings included in Plates XXII, XXIII, XXIV, XXV, and XXVI.

Plate XXII.

A.—Sections, partly diagrammatic, of diseased skin; all magnified between two and three diameters.

(1, 2,) represent earliest stage; in (2) a hair-sheath and sebacious follicle are involved.

(3, 4,) represent the formation of crusts; with the relations of the crusts, at their edges to the epidermis, at their deeper surface to the sebacious follicles.

(3^1, 4^1,) represent the same crusts as seen from above.

(5, 6,) represent the condition of parts, when an extensive tract of skin is simultaneously affected. These are actual copies; (5), of an advanced state of disease on the udder; (6), of the uniform variety of the disease affecting the back.

B.—Vertical section of skin, showing sebacious glands and sheaths of hairs, both continuous with the cutaneous exudation: as seen with a two-inch object-glass.

C.—Crust or scab detached from skin, with group of sebacious glands and a hair: as seen with a two-inch object-glass.

Plate XXIII.

A.—Crust or scab detached from skin, with portions of hair sheaths and ducts of sebacious glands: as seen with two-inch object-glass.

B.—Section of a portion of skin from which a crust has been removed, showing denuded condition of true skin, with undermining and splitting of surrounding epidermis, also a tube opening on the surface of the true skin, and leading probably to sebacious glands: as seen with a two-inch object-glass.

C, D.—Sections of mucous membrane of hard palate, showing destruction of epidermis and of papillæ. In both cases the papillæ corresponding to, and for some little distance around, the excavations were deeply congested: as seen with a two-inch object-glass.

Plate XXIV.

A.—Congestion of omasum, as seen with a one-inch object-glass. The figure includes one papilla and a portion of another (*a. a.*)

B. Vegetable fungus growing from sloughs of omasum, as seen with quarter-inch object-glass.

C.—

(1.) Portion of slough of abomasum, showing pigmentary matter accumulated round stomach follicles and vessels, as seen with quarter-inch object-glass.

(2.) Vertical section through slough of abomasum, magnified about two diameters.

Plate XXV.

A.—

(1.) Healthy stomach tubules from abomasum, acted on by acetic acid.

(2.) Portion of slough from abomasum acted on by acetic acid, showing pigmentary matter and altered stomach tubules.

As seen with quarter-inch object-glass.

B.—Altered stomach tubules from slough of fold of abomasum: as seen with quarter-inch object-glass.

C.—

(1.) Altered stomach tubules from slough of abomasum in deer.

(2.) Blood vessels (probably) similarly altered.

(3.) Healthy stomach tubules from abomasum of same deer.

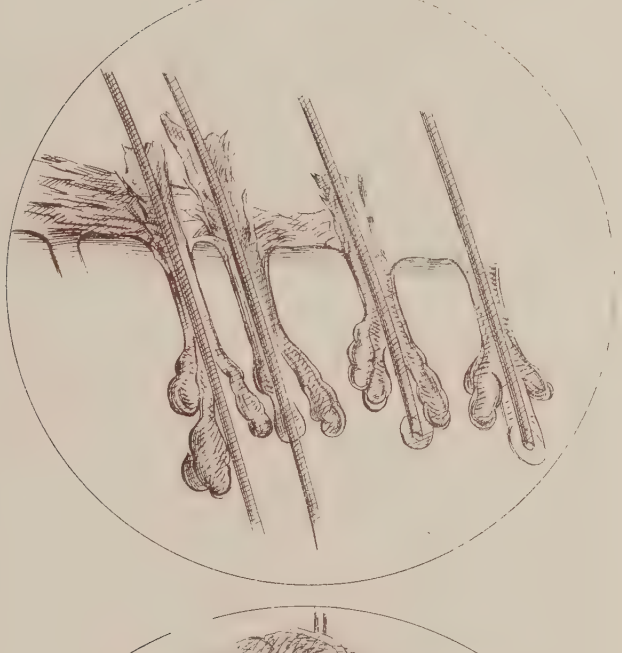
As seen with quarter-inch object-glass.

Plate XXVI.

A.—Submucous hæmorrhage of cæcum, as seen with one-inch object-glass.

B.—Submucous hæmorrhage of trachea, as seen with one-inch object-glass.

C.—Submucous hæmorrhage of vagina, as seen with one-inch object-glass.



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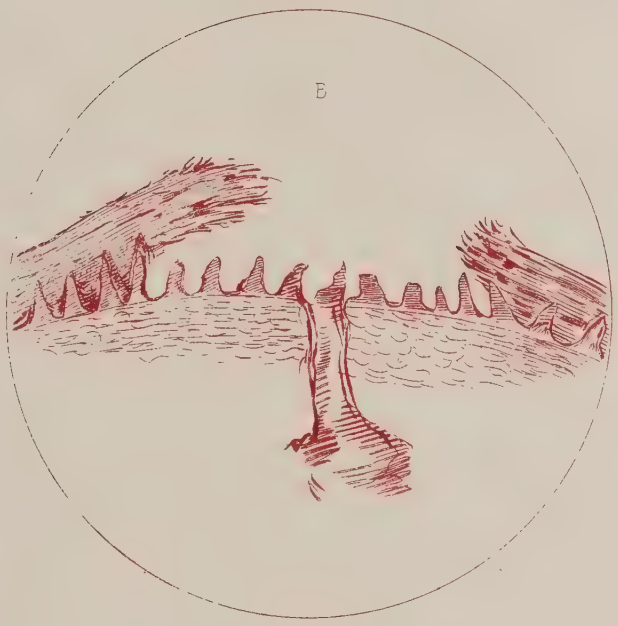
PALL MALL

A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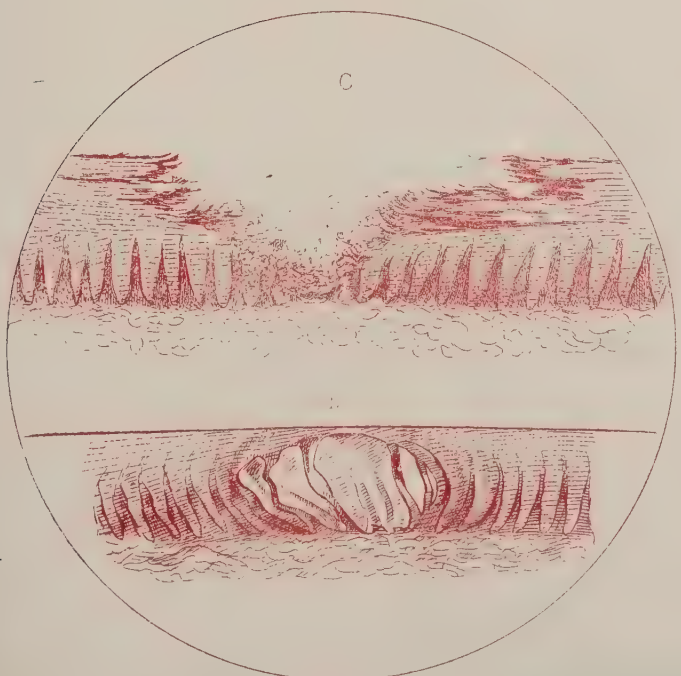
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REFORM CLUB
PALL MALL

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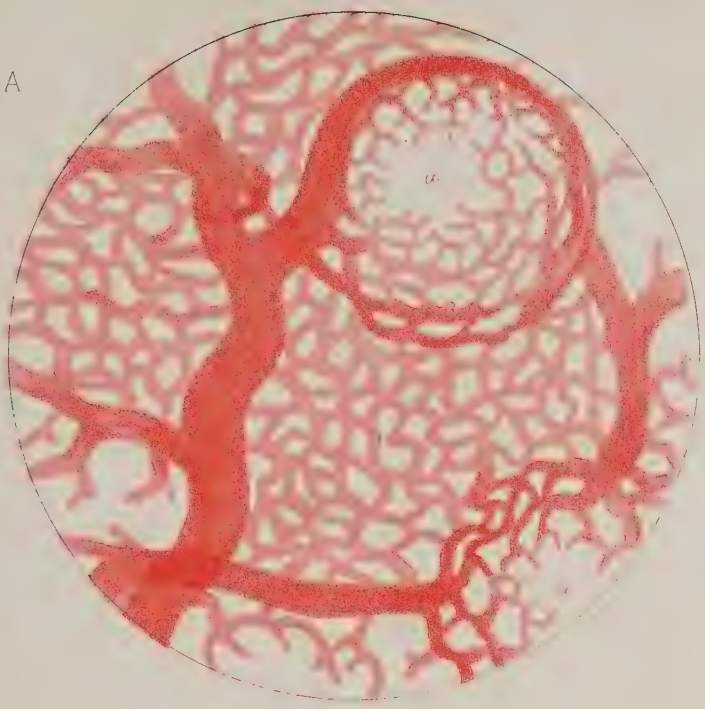

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ATHENÆUM CLUB
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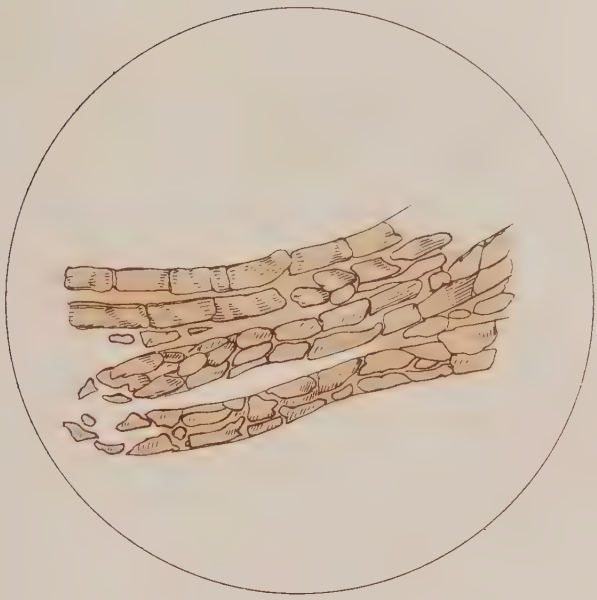

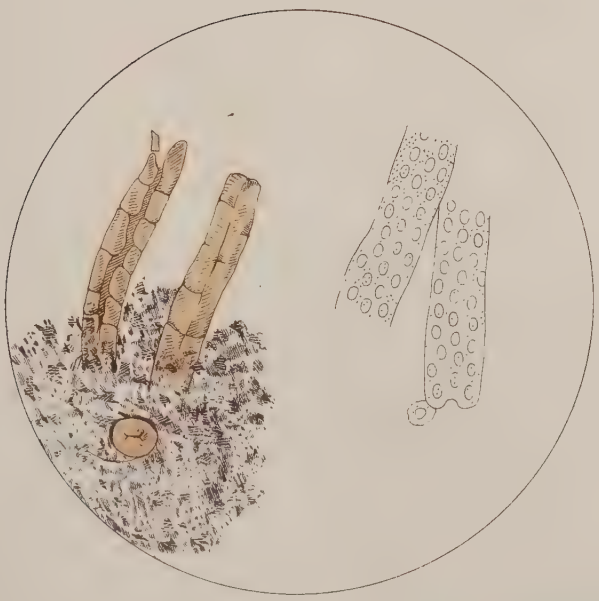

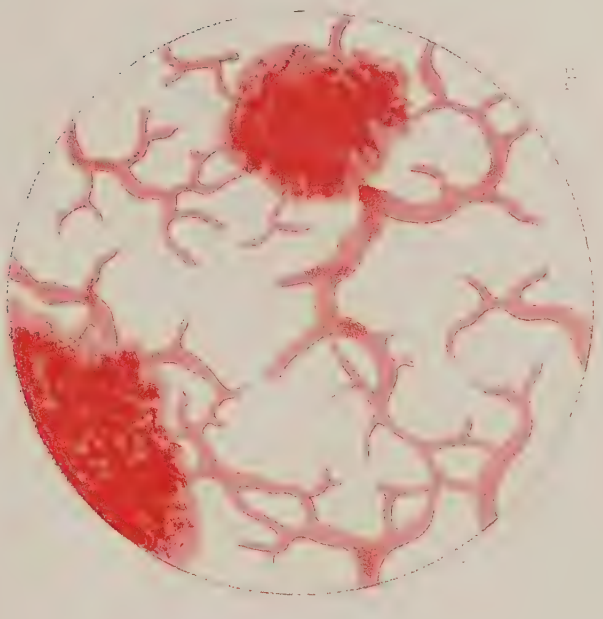

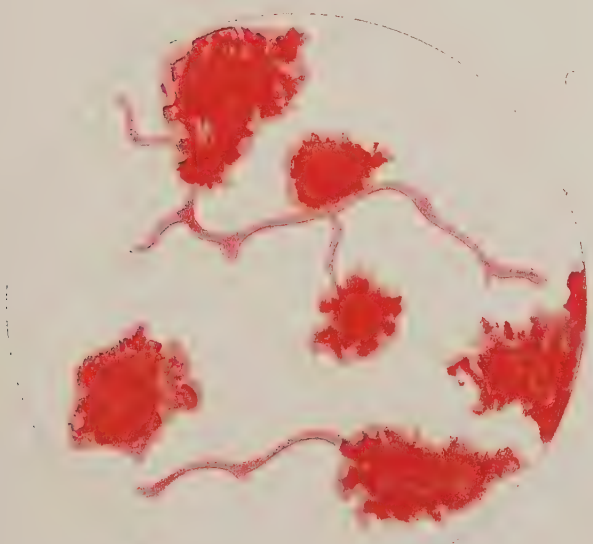

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SECTION OF HEAD OF SHEEP SHEWING.

a. b. Congestion, Excoriation & Apthous condition of base of Tongue & Fauces.
c. Congestion, of upper orifice of Larynx,
d Congestion of Mucous membrane of Nose.
e. Section of Brain.

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MOUTH OF SHEEP SHEWING THICKENING OF EPITHELIUM CONGESTION & EXCORIATION.

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Microscopical Researches on the Cattle Plague.

REPORT TO HER MAJESTY'S COMMISSIONERS,

BY

LIONEL S. BEALE, M.B., F.R.S.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, PHYSICIAN TO KING'S COLLEGE HOSPITAL, AND PROFESSOR OF PHYSIOLOGY AND OF GENERAL AND MORBID ANATOMY IN KING'S COLLEGE, LONDON.

I. Of Certain Changes in the Vessels and in the Blood.—Of the minute veins and capillaries of various tissues and organs, and of their contents.—Of the changes observed in the walls of the smallest vessels.—Of the contents of the smaller vessels.—On the alterations in the blood found in the large vessels.—Inflammatory lymph not commonly met with.—Increase of the soluble matters in the blood.

II. Of the Microscopical Characters of the Secretions and Discharges in Cattle Plague.—Discharges from the mucous surfaces.—Fungi in the discharges.—Contents of the stomach and intestines, urine, vagina.—The milk.

III. Of the Morbid Changes in the Tissues and Internal Organs of the Body in Cattle Plague.—Of the eruption on the skin of the udder.—Of the papillæ of the tongue.—Of the state of the third and fourth stomachs.—Of the villi and glandular follicles of the small intestine.—Of the liver and kidney.—Of the mammary gland.—The brain, spinal cord, ganglia, and nerves.—Muscles. *Bodies resembling Entozoa in the Muscles.*—Structure of the investing membrane.—Of the contents of the entozoon like-body.—Tenacity of life.—Conclusions of previous observers.—Of the probable manner in which these bodies reach the muscles.—Of the increase of the germinal matter in the tissues and in the blood.—Of the death and decay of the soft and rapidly formed cells.

IV. Of the Nature of the Morbid Poison, or Contagium of Cattle Plague.—Of the movements occurring in the mucus corpuscle and of its mode of multiplication.—On the changes occurring in ordinary living pus.—Pus is germinal matter, and may come from any form of germinal matter in the body.—Properties and powers of normal germinal matter, and of the pus descended from it.—Of the movements occurring in very minute particles of germinal matter.—Vaccine lymph.—No differences to be detected in the appearance of different kinds of living matter.—Of the passage of contagious matter into the blood.—Of the multiplication and reproduction of the contagious matter in the infected organism.—Concerning the possibility of the materies morbi passing into the substance of normal living germinal matter.—Conclusion.

*** The dimensions of any object represented in the drawings can be ascertained by measuring it upon the scale at the foot of each plate magnified *the same number of diameters as the object itself.*

This investigation is an attempt to ascertain the nature of the most fatal contagious disease yet known, the Cattle Plague as it occurs in this country. The inquiry necessarily involves a minute examination of many of the different tissues and fluids of the body at different stages of the disease. The extent and difficulty of the undertaking are much increased by the necessity of investigating many general pathological changes concerning the nature of which there still exists the greatest difference of opinion. I shall therefore have to discuss many points which are not peculiar to this disorder alone, but which are common to it and many other diseases, both in man and animals. Such an inquiry must needs be imperfect, but if some of the facts ascertained in its course should only suggest new lines of still more minute research and lead to more thorough investigation, one important object of all scientific work will have been gained. I have not had time to institute comparisons between the textures in Cattle Plague and the corresponding tissues of healthy animals prepared in precisely the same manner, but it is clear that besides this, careful comparative researches should have been made concerning the changes which affect the same tissues in the lung disease and other maladies to which cattle are liable, especially at this time.

In prosecuting to a useful conclusion an investigation of this kind, perhaps the greatest difficulty which the observer has to overcome is the almost unconquerable tendency to form an opinion as to the nature of the affection before the facts ascertained render it reasonable or safe for him to do so. Moreover, the very fearful fatality of the disease, the consequent anxiety of the public, and the constant succession of new views upon the subject, tend seriously to hurry the observer to a hasty conclusion of some kind and interfere with that laborious, steady, long continued, thoughtful investigation, and dispassionate contemplation of its results, which are so essential to the successful prosecution of any difficult and involved scientific inquiry. Nor can I hope that the minute details upon which alone the value of any conclusions arrived at intirely depends will be of general interest, while they may tire the patience of many, and perhaps even irritate those who are most painfully interested.

Upon the whole I think I shall render what I have to say most easily intelligible and least uninteresting, if I commence with the consideration of the most striking morbid changes observed in animals which have died of the Plague, and then work backwards as it were, with the view of ascertaining their relation and the mode of their production, and at last make an attempt, imperfect though it must needs be, to explain the phenomena and recount the order of their occurrence from the time when the animal received the poison to its death.

As the general pathological changes observed by the unaided eye have been very fully and carefully recorded by Dr. Bristowe and others, I shall restrict myself, as far as possible, to the microscopical investigation of the diseased textures and secretions.

It may be desirable for me to state that all my specimens have been prepared in the same manner, according to the principles already laid down in former memoirs.* In very many the vessels have been minutely injected with transparent Prussian blue fluid.

The magnifying powers employed vary from the two-inch, magnifying about twenty-nine diameters to the one-fiftieth recently made for me by Messrs. Powell and Lealand, which magnifies upwards of two thousand five hundred diameters. The illustrations were all drawn on the wood blocks by myself, according to scale, so that, with the aid of the scales of measurement appended to each plate, the exact dimensions of any object can be easily ascertained. The engravings have been made under my immediate superintendence by Miss Powell or by Mr. Hart. One of my pupils, Mr. Nettleship, has assisted me in many ways, and has enabled me to go over a greater extent of ground in a limited time than would have been possible without his assistance.

Of the morbid changes observed in animals that have died of the Cattle Plague, as it occurs in this country, the one which appears to me the most remarkable is a highly congested state of the capillary vessels of many different textures and organs. It is almost invariably observed, and is often of very great intensity. Sometimes where congestion is not seen after death, changes may be demonstrated in the vessels themselves and in the tissues, which I shall show afford evidence of congestion, or at least stagnation

* See papers in the "Philosophical Transactions," "Microscopical Journal," and the "Archives of Medicine," from 1857 to 1864. A detailed description of the method of preparation, including the mode of injecting followed, will be found in "How to Work with the Microscope," 3rd Edition.

Dr. Beale. Report to Commissioners.

of the blood, having existed at an earlier period of the disease. Not unfrequently, careful examination of the affected textures reveals vessels filled with an almost colourless fluid, which has resulted from changes having taken place in completely stagnant blood.

But as this congested state is by no means uniform in all the different textures, or of equal degree in every part of the same tissue, while the capillaries of some organs (those between the uriniferous tubules of the kidney, those of the lobules of the liver, those of the mammary, and probably some other glands), are not as much congested as they are often found in healthy animals killed suddenly, it cannot be referred to any general impediment in the circulation, or regarded as a consequence of congested lungs, a weak heart, or some morbid affection of the nerve-centres which regulate and control the organs of circulation.

On the other hand, patches varying much in size, but distinctly separated from one another by uncongested, or only slightly congested, portions of tissue, may be observed here and there of an intensely dark red colour from the extreme congestion of the smallest capillaries and veins, and frequently these patches are more or less circular in form, as if the congestion had commenced at a point and spread from this outwards in every direction. This fact would seem to indicate that the congestion had commenced at several different points in the affected tissues; that, in fact, there were several distinct foci of congestion in the same tissue, while the changes that have taken place in the tissues and blood-vessels corresponding to certain of these patches prove conclusively that they were not all produced at the same time, but were developed one after the other at varying intervals.

Congestion, however, is by no means the only morbid change *constantly* observed in Cattle Plague. An increased secretion from the surfaces of most of the mucous membranes is always present, and careful observation has convinced me that the masses of germinal matter (usually termed nuclei) of almost all the textures of the body are invariably larger than in health; and in some textures the proportion of germinal matter to the formed material is two or three times as great as in the healthy state. But the increased discharge from the mucous surfaces, and the increased formation of germinal matter, are probably due to the pouring out of an increased amount of soluble nutrient material from the congested capillaries. In fact, from whatever point of view I commence to discuss the nature of this terrible disease, I am led back to the contemplation of the congested state of the vessels, and from the fact that these congestions appear to commence in many different spots, and in the smallest veins or capillaries, I am led to the opinion that various symptoms occurring during life, and the morbid changes seen in many textures after death, are the direct result of these congestions, or are due to the altered state of the nutrient fluids supplied to the tissues consequent upon the generally deranged state of the circulation which must very soon ensue. I think that whatever causes these local congestions in the capillaries is the cause of Cattle Plague.

I propose, therefore, to describe in the first place what I have observed in connexion with the congested vessels and their contents; secondly, to refer to the alterations in the character of some important secretions; thirdly, I shall briefly describe some of the morbid changes which have occurred in certain solid organs and tissues; and lastly, I shall offer some remarks upon the probable nature of the morbid poison of Cattle Plague, and endeavour to account for its action.

I.—Of certain Changes in the Vessels and in the Blood.

Of the minute veins and capillaries of various tissues and organs, and of their contents.—Of the contents of the smaller vessels.—On the alterations in the blood found in the large vessels.—Inflammatory lymph not commonly met with.—Increase of the soluble matters in the blood.

Of the Minute Veins and Capillaries of Various Tissues and Organs, and of their Contents.—The veins and capillaries of the mucous membrane of the conjunctiva, nares, mouth, larynx, trachea, and bronchial tubes contain much blood. In almost all case those of the fourth stomach and intestine are intensely congested. The capillaries and veins of the tongue, epiglottis, and fauces are in the same state, and those of some of the air cells of the lung are so stretched with blood that the intervals between adjacent capillaries are almost obliterated, and the external surfaces of contiguous vessels are almost in contact. There is also a highly congested state of the mucous membrane of the vagina and genital organs, but the capillaries of the mammary glands, which I have examined, were not greatly distended with blood; indeed, I think there must have been much less blood in the glands than in their healthy, active, and secreting condition.

If, however, a mucous surface appears, at the time of the death of the animal, perfectly pale, we must not, therefore, infer that its vessels have not been distended with blood in the course of the disease. In many instances, changes have taken place in the blood, the red corpuscles having been disintegrated, and its dark red colouring matter having disappeared. In many tissues which were almost devoid of colour, the capillaries were still found to be much enlarged and filled with an almost colourless mass, consisting of a few smooth circular corpuscles, probably altered red blood corpuscles, much granular matter, and several masses of myelin. In other instances, the capillaries appeared to have almost wasted, so that it was very difficult even to detect their remains. From the observations I have made it appears to me probable that all these different states have resulted from the occurrence of changes after the vessels had become distended with blood, and circulation in them had completely ceased.

The capillary vessels of the voluntary muscles of the body generally are found injected after death, and in some cases the rupture of the capillary walls has occurred, and extravasated blood is found in the intermuscular connective tissue. Extravasation is also met with in various parts of the respiratory and alimentary mucous membrane. In some of the smallest capillaries of muscle I have seen two rows of red blood corpuscles (Plate I., Fig. 1). The capillaries of many of the small arteries, *vasa vasorum*, are congested, and those distributed to the involuntary muscular coats of the intestine may often be traced in consequence of containing blood, but they often contrast remarkably with the vessels of the mucous membrane, which are intensely congested.

I have carefully examined the vessels of the brain, spinal cord, posterior roots of the nerves, and those of the sympathetic ganglia in one case only. Although in parts of all these organs capillaries containing blood could be found, it could not be said that any remarkable congestion existed; indeed, I have seen specimens of brain and spinal cord taken from slaughtered animals, the vessels of which contained more blood than those in question.

The smaller vessels of the choroid plexuses were all distended, but not to an extreme extent. In some, red blood corpuscles could be seen, but in others the fluid was nearly colourless, and exhibited the characters which will be described presently.

It is interesting to notice that the congested condition so remarkable in most of the viscera of the abdomen and thorax was not observed in the liver and kidney. With regard to the liver, I have noticed that the smaller branches of the hepatic veins contained much less blood than I have often seen in the livers of slaughtered animals. The small quantity of blood in the liver is probably explained by the congested state of the capillaries of the intestine, and I think that in an advanced stage of the disease scarcely any blood passes through the intestinal capillaries towards the portal vein, and it is probable that very little blood is transmitted to the liver at all.

The vessels in the cortical portion of the kidney of animals that have died contain scarcely any blood, and although blood is often found in those of the pyramids, there seems to be even less than is met with in the kidneys of many animals killed by the

tcher. The presence of albumen and casts of the niferous tubes in the urine render it probable that congested state of the renal vessels existed some ie before death, but as the disease advances, no ubt the proportion of arterial blood circulating comes less, and towards the close probably very le blood traverses the renal arteries.

The Malpighian bodies were for the most part newhat larger than in the healthy state, and the reased size was found to be due to the distension of loops of capillaries. In Fig. 7, I have represented e of these loops containing a number of white blood rpuscles, numerous small masses of germinal matter d granules, the nature of which will be discussed in other part of this memoir.

It is perhaps worthy of notice that the capillaries the Malpighian bodies in one of the kidneys I amined were very much thickened, a change which uld indicate that the subject of the disease had not n in a perfetly healthy state for some time previous its death. I have also observed very decided thick- ng of the capillaries of the muscles and other parts, I would remark here, incidentally, that in several the organs of many cases of Cattle Plague, I have n evidence of chronic disease, though not of a fatal aracter.

I shall now endeavour to give a brief general cription of the changes in the structure of the walls the smallest arteries, veins, and capillaries, and of contents of these small vessels as demonstrated by roscopical examination with the aid of very high gnifying powers. Although I shall select favour- e examples for illustrating the morbid appearances ch have taken place in the vessels in the course of disease, I may observe that similar changes, more ess distinct, have been demonstrated in the vessels many different textures, and what I shall state er this head will apply to the vessels of all the ues and organs affected.

Of the changes observed in the walls of the smallest sels.—The small arteries are usually contracted, I think not more so than is commonly observed in nals which have been killed when in a state of th. There is reason to think that during the er periods of the disease the coats of the smaller ries are in a state of relaxation, so that the blood elled by the feebly acting heart flows very slowly g the somewhat flaccid and yielding tubes. This of relaxation, due perhaps to paralysis of the es which supply their contractile coats, or to nges in the nerve centres from which these nerves , is at length succeeded by a state of firm con- ion of the muscular fibres, which persists till time after death. The general outline of the lest arteries, veins, and capillaries is often very en, and considerable bulgings are not unfrequently rved, and in some few instances these might st be called *diverticula* from the vessel. The eter of the capillaries varies very greatly within ort distance (Plate I., Fig. 4; Plate III., Figs. 6). The coats are sometimes granular, instead ing perfectly transparent, and occasionally, oil- ules and myelin particles may be detected in the brane. It is not uncommon to find small oval es of very minute oil-globules with germinal er (nucleus) in the centre, just external to the lary vessels and small arteries, Fig. 2, *a*. Not quently I have observed wasting of the capillary ls, so that it was not possible to follow them rtain parts of their course. This was particularly case in some parts of the surface of the mucous orane of the fourth stomach in spots where shallow essions, looking, to the unaided eye, something superficial ulcers, were observed. See Plate III., 32.

t the most striking, as well as the most constant, ge observed in connexion with the small blood- ls in various tissues and organs was *the increase e size of the masses of germinal matter in their* , and this was especially manifest in the small and capillaries. I have often seen a mass of germinal matter connected with the vessels, composed of smaller masses, as yet not perfectly separated from one another, occupying as much as five or six times the space taken up by the germinal matter in the normal state, Fig. 4.

The increase is very distinct in the germinal matter of the capillaries and smaller veins, Figs. 2 and 4, and it also affects the arteries,—the masses of germinal matter (nuclei) of the muscular-fibre cells, as well as those of the epithelium lining the arterial cavity being very much enlarged, Fig. 3.

A similar change, as will be more fully described further on, affects the germinal matter of the connective tissue, the so-called connective tissue corpuscles, as well as that of the fat cells, or adipose vesicles (see page 144), often seen in great number close to the smaller vessels, and that of the gland cells as well as the tissues of the body generally.

The *nerves* distributed to the coats of the smaller arteries and veins, and those seen near the capillaries, do not exhibit degeneration, nor have I been able to detect any structural changes in the fibres of the nerves. The masses of germinal matter (nuclei) are much enlarged. But although no alteration in structure, with the exception of the increase in size of the masses of germinal matter already alluded to as existing in all tissues, can be observed in the nerve-fibres, it seems scarcely possible that the highly congested condition of the capillaries, and the altered state of nutrition consequent upon this, could long exist without giving rise to serious functional disturbance of the nerves which lie just external to them; indeed, it is probable that the delicate fibres external to the capillaries after a time become completely paralysed, partly in consequence of the pressure of distended vessels, and partly from the action of the altered fluid with which they are bathed.

Perhaps all anatomists and physiologists are not aware of the exceeding number and highly elaborate arrangement of nerves and ganglia lying immediately beneath the mucous membrane, and between the layers of the muscular coat, throughout the small intestine. The first of these microscopic plexuses and ganglia was described by Meissner in 1857, and the last by Auerbach, in 1862,* but they appear to be more numerous and of far higher functional importance than would be supposed from the descriptions and drawings given. In the ruminants the ganglia are exceedingly numerous, and I have appended drawings from the intestine of the ox (Figs. 5 and 6, Plate I.), from which some idea may be formed of the vast number of nerves and ganglia existing in the first of the situations above indicated. The animal from which these specimens were taken did not die of Cattle Plague.

In the Cattle Plague these beautiful ganglia participate in the change affecting all the tissues which suffer from impeded circulation of the blood. The masses of germinal matter of the ganglion cells and nerves have increased considerably in size in consequence of the more abundant supply of nutrient material. As a consequence their action would be diminished, and at length probably suspended. It is very probable that the complete paralysis of the afferent and efferent nerves of these ganglia which preside over the vessels (and probably to a great extent influence the action of the muscular coat of the intestine itself, and certainly the muscular fibres of the mucous membrane), occurs in bad cases of Cattle Plague, and if such paralysis were to continue even for a short period of time, it would alone afford sufficient explanation of the fatal result.

Of the Contents of the Smaller Vessels.—As I have before stated, some of the small vessels of a tissue taken from an animal destroyed by Cattle Plague are distended with blood, in which the red corpuscles can be distinctly seen (Fig. 8), while others are filled with an almost colourless, or slightly yellowish, fluid,

* G. Meissner ueber die Nerven der Darmwand. Zeitschrift für. rat. Med. viii. 1857, S. 364. L. Auerbach, Ueber einen Plexus myentericus, Breslau, 1862.

evidently resulting from changes having occurred in blood; indeed, in many cases it is possible, by the character of the contents (Figs. 8, 9), to distinguish the vessels in which the blood became stagnant at an early period of the attack from those which became congested much later in the disease, perhaps only very shortly before death.

In those vessels which contain blood the *serum* is invariably of a reddish colour, from the solution of red blood corpuscles, and in many cases the adjacent connective or other tissue is slightly tinged by it.

The *red corpuscles* vary in character according to the time which has elapsed since stagnation occurred. In many instances I have observed nothing unusual in their appearance. Occasionally they are contracted and irregular in form, with a dark outline and refracting highly, but most commonly the red corpuscles, seen in the interior of the capillary vessels, are pale, perfectly circular in outline, with a very smooth and even surface, and so very transparent that many of them may, without great care, be passed over entirely. In some small veins I have seen very large red blood corpuscles, which were found to measure twice the diameter of the ordinary corpuscles, and sometimes stellate corpuscles and dark red angular particles may be observed (Figs. 8 and 11, at *a*).

In all cases the *white blood corpuscles*, or masses of germinal matter closely resembling these, are considerably increased in number, and are very large. Sometimes a capillary vessel appears to be occupied with these corpuscles and their descendants only (Fig. 9).

The small veins and capillaries are often filled with an almost colourless fluid, containing much granular matter, amongst which the remains of undoubted red blood corpuscles and small angular masses of red colouring matter may be discerned. In this fluid oil globules and curiously shaped masses of *myelin* are almost constantly met with. Besides the white blood corpuscles, very numerous and often exceedingly minute masses of germinal matter are present, which possess the same refracting power as the material of which the smooth, and probably youngest, white blood corpuscles consist. These are readily distinguished from the myelin corpuscles and oil globules (Plate III. Figs. 37, 40), by being readily coloured with the carmine fluid; they are well seen, and are perhaps most numerous, in the small veins and capillaries of the *fourth stomach* and *small intestine*, (Plate I, Fig. 8, below *b*, Plate III. Figs. 31, 35, 36), those of the *pia mater*, the *choroid plexuses*, and the capillaries of the *Malpighian body of the kidney*, Fig. 7, but I have seen them in the capillaries of almost all the tissues and organs affected in Cattle Plague.

The germinal matter of the epithelium lining the smaller arteries and veins is considerably increased, and in some cases to such an extent as to form small elevations, projecting from the lining membrane into the interior of the vessel. In many instances I have seen spherical and oval collections of germinal matter in small arteries, veins, and capillaries, which would seriously interfere with the free passage of the blood. The arteries are not dilated behind the situation of these masses, nor for the most part are the capillaries which open into the smaller veins which are obstructed. The vessels are not shrunken and contracted, but they are not generally dilated and distended with a considerable quantity of blood. It seems probable that the circulation is carried on through the adjacent vessels which still remain pervious, without those in which obstruction has occurred being subjected to any greatly increased pressure. The weak contraction of the heart may be insufficient to cause distension of the vessels in front of the obstructed portion; but in places where the capillary congestion is very considerable, and especially in the transparent sub-mucous areolar tissue corresponding to the congested patches of mucous membrane, which presents great advantages for the minute examination of vessels, I have discovered actual plugs in the smaller arteries, and in many instances a little spherical mass has completely occluded a vessel scarcely larger than a capillary, just at the point at which it diverges from the small arterial trunk.

In Fig. 3, I have represented a good example of this. The mass here was nearly spherical, and composed of several small masses of germinal matter, which had evidently resulted from the growth and division of one, or at most a very few, masses.

Although I have detected in many cases masses of material which would produce complete obstruction, I do not think that this physical explanation will account for the congestion in all, or even in the majority of instances in which it occurs.

Let me now consider the nature of the mechanical obstruction where it undoubtedly exists. It would perhaps be concluded that it consisted entirely of fibrin, or that fibrin had coagulated around one or many minute foreign particles, which had gained entrance into the blood, and that thus a mass was formed which was too large to traverse the smaller vessels. But at least, in many instances, the plug is composed of germinal matter, as is positively proved by an examination of specimens properly prepared with carmine fluid. Nor am I able to decide with any certainty concerning the nature or origin of these masses of germinal matter, but will venture to offer the following suggestions, although I hope to be able to study the question more fully.

1. They may be much enlarged white blood corpuscles.

2. They may result from the adhesion of one or more white blood corpuscles to foreign particles in the blood, and their subsequent growth.

3. They may result from the growth and multiplication of masses of germinal matter not existing in the blood, normally, the germs of which have entered from without.*

4. They may have grown from the interior of larger vessels and have been detached from little elevations which had formed upon the lining membrane.

These and many other hypotheses that might be advanced cannot, however, be fairly discussed until several other matters have been carefully considered.

The obstruction to the capillary circulation which exists without any distinct mechanical impediment to the onward course of the blood being demonstrable may be accounted for in many ways. It may be due to physical or chemical changes in the blood itself, to an altered state of the white blood corpuscles, to the increased action of the masses of germinal matter of the capillaries and their projection into the interior of the vessel, and to other circumstances. But extended investigations in this direction are yet required.

But although there is room for much speculation and difference of opinion concerning the precise way in which the congestion of the capillaries is brought about in these cases, there can be very little doubt as to the serious results occasioned. Not only must the composition of the entire blood be soon very much altered and the nutrition of every texture in the body impaired, but the portion of tissue receiving its nutrient fluid from the affected vessels must seriously suffer, and at length die. The blood probably becomes stagnant in the vessels of the mucous membranes corresponding to each small patch of morbid change (p. 139), while the circulation in the neighbouring vessels is by no means perfectly carried on, and perhaps there is some tendency in the blood to stagnate in these in the same manner. If the animal lives long enough the portion of tissue in which the circulation has quite stopped die and slowly become separated from the rest. If the obstruction occurred very gradually, a slow, more or less circumscribed texture-wasting, instead of sudden death, would result, and such wasting of the tissues is actually observed, as will be described further on.

* The foreign particles might be minute germs of low animal or vegetable parasites which had gained access to the interior of the vascular system, around which fibrin had coagulated. Or the obstruction might result from the multiplication of such particles without precipitation of fibrin; or the products resulting from changes occurring in these particles or produced in the blood by them, might precede the precipitation of the fibrin or the adhesion and multiplication of white blood corpuscles.

ese cases there is no active inflammation in the im-ediate neighbourhood of the patch, probably because e state of the blood in the system generally has become uch altered, while the heart's action has become eak, and the depressed condition of the nervous)wers would tend still further to affect the action the heart and arterial walls.

On the Alterations in the Blood found in the large essels.—I have examined the blood as obtained from vein during life in many cases of Cattle Plague, but ve not observed in it anything peculiar to this disease one, Plate I. Fig. 8. The *red corpuscles* vary in size d refractive power as in healthy blood, and although many cases a vast number of the corpuscles are all, contracted, highly refracting, and exhibit a well-arked stellate character, it is scarcely necessary to int out that these characters are not peculiar to ttle Plague or even to diseased blood, for they have en observed in health. They are no doubt due mainly alterations that have occurred in the density of the uor sanguinis, the consequence of the altered con-ions under which the circulation has been carried in severe cases of Cattle Plague, and may be met th in many conditions of the system, differing from e another essentially in their nature.

The red blood corpuscles vary in size, perhaps to a eater degree than in the healthy state. Some very ge ones are represented in Fig. 11., and these were esent in considerable number. This may be due to slow circulation through the vessels and the very perfect oxidation that must necessarily occur in the er stages of the disease.

The *white blood corpuscles*, although much more merous in the blood stagnant in the small veins and illaries at the time of death, do not appear in con-ntly increased numbers in blood drawn from a large n during life. Upon an average the white cor-scles themselves are somewhat larger than in the althy state, and some are very much increased in e. The minute granules present in the substance of white corpuscles are very numerous, and in some tances I have seen minute oil-globules in the outer t of the white corpuscles.

The examination of the blood from a large vessel ring life cannot of course enable us to form any ion of the important changes taking place in the d in the capillary vessels at the same time. Even ugh very important chemical alterations had oc-red in the blood as it passed through the capil-ies, little impression might have been made upon general mass when these small portions became xed with it. Any large white corpuscles, or masses of minal matter not present in the normal blood, would essarily be stopped in the capillaries, and although y might have been formed in great number we uld not detect them in the blood in the large vessels. e most serious and fatal alterations might indeed ur in the circulating blood without any very obvious nges being observable in that which is drawn from ein during life, or taken from the heart or large sels after death. As has been already stated, the te blood corpuscles, or corpuscles which cannot be inguished from them, are found in great number in capillaries in which the blood has been stagnant for ae time, and a vast number of minute masses of minal matter, the origin of which is doubtful, are present. The discussion of the nature and origin, significance of these particles involves the consider-on of many questions not directly connected with Cattle Plague. I propose, therefore, to consider part of the inquiry in the sequel.

But although the extreme changes which have en place in the blood in the smaller vessels cannot sibly have proceeded to the same extent in the ole mass of the blood, since the death of the animal uld result long before any such degree of change been reached, there is important evidence of alte-ons in the general mass of the blood having urred in many cases of Cattle Plague. In the very tre of a black clot taken after death from the aorta, ound large collections of very simple vegetable organisms, as represented in Fig. 11, and although I cannot assert positively that these were present during life, it is almost certain that they existed before, but perhaps not long before, death occurred. I have seen precisely the same species of organism upon every mucous surface I have examined, and in the secretions from the nose and eyes similar bodies are very abundant. I do not, however, regard the development of these organisms as a cause of death, or of the disease which destroyed life.

Their production is an evidence that important changes have taken place in the blood during life, for these organisms would not live and multiply in healthy circulating blood. The germs of such vegetable organisms probably exist in every part of the body even in health, but they increase and multiply only when the composition of the fluids becomes very much altered. The conditions favourable to their development in the blood are incompatible with the life of man or the higher animals.

Inflammatory lymph not commonly met with.—All observers concur in stating that it is not common to meet with plastic exudations upon the surfaces of the membranes or in the substance of the tissues in cases of Cattle Plague, and although inflammatory products are sometimes observed, they are so small in quantity and so irregular in their occurrence, that it is quite certain that no analogy exists between Cattle Plague and the diseases characterised by such exudations, as pneumonia, pleurisy, acute rheumatism, &c.

Although much that occurs in fevers is also met with in inflammations, it must be admitted that the abundant effusion of inflammatory lymph and the formation of pus in the latter are points of distinction. It is not, I think, difficult to explain why local capillary congestions such as are met with in Cattle Plague should not be associated with the pouring out of large quantities of lymph from the capillaries and its coagulation and accumulation upon free surfaces or in the surrounding tissue.

In inflammation the circulation in the capillaries would only be very gradually brought to a stand-still. As the vessels became more and more stretched, liquor sanguinis and small particles of germinal matter allied to the white blood corpuscles would readily pass through the very thin walls. These particles, like the masses of the germinal matter of the tissues, would continue to grow and multiply so that by the time complete stagnation had taken place a vast number of spherical masses of germinal matter, derived partly from the white blood corpuscles and partly from the germinal matter of the capillaries and of the tissues, would result. These might continue to increase at the expense of the surrounding tissues and fluids until the soft mass of rapidly growing germinal matter known as pus, is produced.

But in these local capillary congestions the case is very different. The capillary probably becomes completely obstructed before time has been allowed for the escape of much liquor sanguinis and corpuscles derived from the white blood corpuscles. The material in the blood which gives rise to the obstruction probably takes up the surrounding matter more readily than the white blood corpuscles, and increases at the expense of the adjacent pabulum of every kind. And again it has been shown that in Cattle Plague extreme distension of the capillaries is by no means constant where there is complete stagnation of the circulation. All this points to a something in the blood as the cause of the local congestion. A morbid state of the blood, induced by the passage into it of some living matter, seems to be the first change in fevers, while, as is well known, ordinary acute inflammation may occur from an injury without any marked change being induced in the blood in the first instance. Let some of the small arteries distributed to a limited portion of tissue be a little dilated for a time, as by partial paralysis of their nerves, and some of the phenomena of inflammation may be brought about, although the blood which circulates through the capillaries is in a perfectly normal and healthy state.

Increase of the soluble matters in the blood.—The

soluble matters (in boiling water) of the blood are increased in proportion in Cattle Plague, and in many if not in all fevers, and they transude through the walls of the vessels more readily than in the healthy state. It is probable that the imperfect oxidation necessarily occurring in the blood is connected with the production of this increased proportion of soluble materials. Thus the nutrition of the tissues becomes altered, and the germinal matter (nuclei) being supplied with an increased proportion of soluble nutrient material increases in amount. In fevers generally the same fact is observed in all the tissues, and it is invariable in local inflammations. Indeed in this increased growth of germinal matter there is a close analogy between fever and the essential phenomena of inflammation.

The blood serum in all the cases of Cattle Plague I have examined has exhibited a dark colour; and even the very thin stratum subjected to examination by the higher powers invariably exhibits a reddish brown tinge, which is not seen in the serum of healthy blood when examined in precisely the same way.

In two specimens of healthy ox blood the amounts of solid and soluble matter in 100 parts were as follows:—

	I.	II.
Solid matter - - -	19·87	20·63
Substances soluble in boiling water	1·33	1·11

The solid matter contained in I. 6·69, and in II. 5·38 per cent. of substances *soluble in boiling water.*

Three specimens of blood taken during life from animals suffering from the Cattle Plague, gave the following per-centage:—

	I.	II.	III.
Solid matter -	23·1	22·78	24·88
Substances soluble in boiling water -	2·91	2·22	1·81

The solid matter contained, respectively, 12·62, 9·72, and 7·22 per cent *of soluble substances.*

So that not only is the per-centage of *solid matters* greatly increased in the blood of Cattle Plague as compared with that of health, but the extractives and other matters soluble in boiling water are present in increased proportion.

It would be very desirable to ascertain if a greater proportion of soluble matters would pass through a dialyser from the blood of cases of Cattle Plague than from healthy blood; the fact of the tissues being infiltrated with the serous portion of the blood renders it probable that this would be the case, but I have not been able to try the experiment.

Neither the changes in the composition of the blood above referred to, nor the increased tendency of the fluid constituents to permeate the walls of the vessels, are however peculiar to Cattle Plague. These and other changes are common to a number of diseases which, although depending upon different morbid poisons, possess many characters in common and are all characterised by a greater development of animal heat, probably dependent upon increased nutrition and growth of the germinal matter of the tissues generally, consequent upon the transudation through the capillary walls of a greater amount of soluble nutrient matters than occurs in the healthy state.

I would venture to sum up the main facts and arguments advanced in the foregoing section as follows. In various tissues in cases of Cattle Plague there are patches of local congestion, sometimes accompanied with extravasation of blood. The different patches of congestion are not formed at the same time, but successively. The congestion is due to changes occurring within the capillaries. In some instances an impediment which acts mechanically can be seen in the vessels, but this is not invariably the case. The blood contains a greater proportion of substances soluble in boiling water than exists in the healthy state; and it is probable that certain of the soluble nutrient constituents are altered in composition and pass through the walls of the distended vessels more readily than in health. Not only are the masses of germinal matter (*nuclei*) of the capillaries, arteries, and veins, invariably increased in size, but those of the tissues lying external to the capillaries participate in the change, and in some cases the proportion which the germinal matter bears to the formed material of the tissue is three or four times greater than in the healthy state.* The alterations in the composition of the blood and the morbid changes occurring in the various tissues and organs of the body are probably consequent upon the altered state of the circulation in the capillary vessels.

It is probable that when the circumstances which give rise to the retardation and cessation of the circulation of the blood in the capillaries shall have been fully made out, a satisfactory explanation of the phenomena of the Cattle Plague will be arrived at, and the "cause" of the disease discovered.

II.—Of the Microscopical Characters of the Secretions and Discharges in Cattle Plague.

Discharges from the mucous surfaces.—Fungi in the discharges.—Contents of the stomach and intestines.—Urine.—Vagina.—The milk.

I hoped to have been able to describe seriatim, and illustrate by drawings, the microscopical appearances I have observed in the various secretions and solid textures in Cattle Plague, but the time allowed for the completion of my researches being so short, I shall only attempt to give a brief sketch of some of the changes which appear to me of the greatest importance.

Discharges from the mucous surfaces.—The discharges from the mucous surfaces, as from the nose, the conjunctiva, the mouth, bronchial tubes, and vagina, are all characterised by the presence of a vast number of epithelial particles varying in age, and consequently in the degree of their development.

The oldest cells are often partially disintegrated, and not unfrequently detached in considerable flakes or collections. The formed material forming the outer part of these cells is often granular, and the structure invaded and partially disintegrated by numerous fungi. Amongst these old cells too, are often found numerous minute masses of germinal matter (nuclear particles), which have probably made their way from the deeper part of the epithelial layer, if not from the blood; and, in some instances at least, it is the rapid multiplication of these which has led to the superficial cells being detached in flakes or collections.

Very many immature cells are also observed, and from the great number of small cells with diverticula, buds, or offsets, I have no doubt that these cells were undergoing rapid increase. In all these secretions a certain number of spherical granular masses of germinal matter, which might perhaps be termed pus corpuscles, are present.

In some cases movements may be observed in the particles of germinal matter of the same nature as those which take place in the mucus and pus corpuscle, in the young epithelial particles, the white blood, chyle, and lymph corpuscle, and other forms of living or germinal matter. These movements I have spoken of as *vital movements*, because they are peculiar to living things, and cease with life. See p. 147.

In one specimen of nasal mucus I have seen a few corpuscles moving actively like small *amœbæ* (Plate V. Fig. 71), but I could not ascertain whether these were actual amœbæ, or living particles from the organism of the animal. Nor, I think, is it probable that by future research we shall be able to demonstrate characters which will enable us to distinguish with any certainty different kinds of germinal or living matter from one another. This question will be further considered in the sequel.

Besides the spherical masses of germinal matter above referred to are numerous small masses of germinal matter, some of which may be offsets from the beforementioned young and rapidly growing epithelial particles, or of the cells descended from these like pus corpuscles, but it is very doubtful if all have this origin.

* This part of the subject is more fully discussed in page 144.

From the fact that many of the most minute particles of germinal matter in the discharges are not unfrequently found associated with shreds of fibrin, I consider it probable that they are derived from the capillary vessels below the epithelial surface. Blood corpuscles are not unfrequently met with amongst the cells,—a fact which renders it almost certain that this opinion is correct. And from the circumstance that such particles are often found in small collections, I argue that they must have increased in number *after* they had escaped from the vessel. Hence, it is possible that such minute particles, although most easily passed over and apparently the least important elements of the secretion, are really those which give to it its specific powers, and that in these particles, and in these only, the contagious property resides; but this subject will be further considered.

Fungi in the discharges.—In the discharges from the mucous surfaces, fungi are almost invariably present, and in cases in which the discharge has remained for some time upon the mucous surface they are very numerous, and more than one species is certainly present. From the circumstance that these fungi are found in greatest number associated with the oldest epithelial particles, I argue that they are derived from without, and grow and multiply in these discharges as they would in any animal fluids in a state of incipient decomposition if left exposed to the air. Crystals of ammoniaco-magnesian or triple phosphate are frequently present, and result from the decomposition of the fluid portion of the secretion. I have also seen crystals of triple phosphate embedded in the very substance of the epithelial particles, showing that the decomposition of the fluid, even in the interstices of these, had already taken place.

Fungi are not usually found in connexion with the cells from the deepest layers, but I have seen bacteria in very bad cases shortly before death in considerable numbers. That these however are not *essential*, and that they result from the development of germs derived from without, coming in contact with the discharges already in a state of incipient decomposition, seems proved by the fact that specimens of the secretions in which they usually abound, and in which all the essential morbid characters are remarkably distinct, may be obtained, which are altogether free from bacteria and fungi, while if these very specimens be kept for some hours at the temperature of the body, bacteria make their appearance in very great numbers.*

Contents of the Stomachs and Intestines.—I am not able to give a comprehensive report of the results of the examination of the contents of the stomachs and intestines of animals dead of the Cattle Plague.

I have examined the contents of the small intestine, and have observed that many of the epithelial coverings of the villi are detached, and some of the cells disintegrated. It is certain that this change takes place before death occurs. The oval mass of germinal matter in these cells was much larger than in health. Numerous masses of germinal matter of doubtful nature, fat, and myelin particles, bacteria fungi; and vegetable cells, spiral vessels, &c., derived from the food, were found in great number, but my observations are incomplete.

Urine.—I have not instituted a special examination of the urine, because I felt sure this would be fully investigated by other observers.

Vagina.—The mucous discharge from the vagina is often very viscid, and more or less opaque from the number of epithelial particles in it. Many of the epithelial cells exhibit a very beautiful structure, and have evidently grown very rapidly. The exact mode of growth by the process of budding can be understood from an examination of many of the younger cells, Plate II. Figs. 12 and 13, *c*; and from the form and mode of connection with one another of more advanced cells, there can be little doubt concerning the manner of their production. The specimen from which Figure 13 was copied was obtained from a cow only twenty-four hours after she was taken ill, and therefore the changes are not much advanced. The perfectly round bodies near *a* and *b* are sporules of fungi, which are always very numerous in the vaginal secretion, and in this specimen there were at least two different forms, which are figured. In this discharge small masses of germinal matter have been also observed, some of these are represented in Plate V. Fig. 67, as they appeared under the $\frac{1}{5\,0}$; and the difference in appearance between these bodies and bacteria can be estimated by comparing *a* with the other particles in the figure.

The Milk.—I have examined the secretion removed from the udder in many cases, and at different periods of the disease. The microscopical appearances in extreme cases are very distinct, and are easily described. The oil globules, instead of being free and distinct from one another, appear for the most part to have run together, forming masses of considerable size; and sometimes there are small elongated bodies of a considerable degree of hardness consisting of firm fatty matter, composed of the modified milk fat, Fig. 14, *b*. The most remarkable change in the microscopical characters of the milk consists in the presence of numerous granular masses of germinal matter, more or less spherical in form. These have been referred to by every one who has written on Cattle Plague, and have been usually looked upon as pus corpuscles.

Many of these bodies contain distinct oil globules, and some could not be distinguished from the ordinary colostrum corpuscles, Fig. 14, *a*. In fact there can be no doubt that these are the cells in which under normal circumstances the elements of the milk would have been produced, but like the cells of other glands they increase in number *without their characteristic secretion being formed*, and being detached from the follicles of the gland become mixed with the small quantity of secretion previously produced. In extreme cases the whole field of the microscope is occupied with the cells and smaller masses of germinal matter, probably detached from them when they had escaped from the glandular follicles. In Fig. 14 I have represented some of the principal forms of these cells. At *a* is a mass consisting almost entirely of oil globules, but having a distinct nucleus; and above this are smaller cells with a very few oil globules. In some of the pale and delicately granular cells in other parts of this figure a few oil globules may be seen; but besides these, and often where oil globules are entirely absent, are numerous minute spherical and oval particles possessing high refracting power. I shall discuss the nature of these bodies in the sequel, but it is desirable to refer to their general character in this place. The minute spherical and oval particles in question are in the substance of the germinal matter of the masses as represented in Fig. 14. These particles are perhaps of the same nature as those often present in the white blood corpuscles and pus corpuscles, Plate V. Fig. 73, which they resemble in refracting power. Their general appearance under the $\frac{1}{5\,0}$ is represented in Fig. 15. I have sometimes thought that these bodies might be of the nature of fungi, but all the evidence I have hitherto been able to obtain is opposed to this view. I set aside some Cattle Plague milk in order that it might begin to decompose. Upon examining the acid fluid after three or four days, numerous very

* In these experiments I have employed a small glass tube, one end of which is covered by very thin membrane. This is so arranged that the membrane just touches the surface of some distilled water in a little dish or capsule; the whole being placed in a small hot-air oven maintained at a temperature of 100° F. In this way I was enabled to keep the secretions freely exposed to the air, whilst evaporation was compensated for by the gradual imbibition of fluid from below through the pores of the membrane. I have succeeded in preserving mucus-corpuscles, and masses of germinal matter from the higher organisms, alive for a considerably time longer than they would have lived at the ordinary temperature of the air. I am still engaged in various experiments conducted according to this plan, by which one is enabled to imitate very closely some conditions under which changes go on in the body of the living animal.

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minute filamentous fungi were developed, but none of the filaments started from or were connected with, the bodies in question, neither did the particles from which they sprung, or the particles of which the filaments were composed, resemble them in refractive power.

It is evident that these minute, highly refracting particles are not granules of inorganic matter, or of fatty material, for they are intensely coloured by carmine. There can, therefore, be no doubt that they consist of living germinal matter of some kind, and from their arrangement in collections it is reasonable to conclude that they increase in number by multiplication, and that large collections probably result from the germination of a very few, or even from one single body ; and I have reason to think that they increase in number although embedded in the substance of the germinal matter of the cell. I have seen movements occur in the latter and the particles carried from one part of the mass to another. It is probable that in many cases the particles originate in the germinal matter itself.

Mr. Nettleship has examined for me 28 different specimens of milk from animals suffering from Cattle Plague. Nine of the most important are published in the following Table, with two analyses of London milk for comparison, and the general results arrived at by him are appended.

—	London Milk, No. 1.	London Milk, No. 2.	Case 14.	Case 16.	Case 17.	Case 17.	Case 18.	Case 19.	Case 20.	Case 21.	Case 22.
	Oct. 26 1865.	Nov. 7 1865.	Oct. 27 1865.	Oct. 30 1865.	Nov. 3 1865.	Nov. 4 1865.	Nov. 4 1865.	Nov. 14. 1865.	Nov. 14 1865.	Nov. 18 1865.	Nov. 18 1865.
			Convalescent.	3 days before death.	48 hours before death.	24 hours before death.	1 hour after death.	48 hours before death.	48 hours before death.	Convalescent.	
Water	88·77	89·96	87·85	79·85	82·91	80·29	65·13	86·45	78·6	86·93	67·63
Solid Matters	11·23	10·04	12·15	20·15	17·09	19·71	34·87	13·55	21·40	13·07	32·37
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Consisting of											
Oil	2·74	2·8	2·81	8·65	4·93	8·09	21·71	2·57	7·05	5·89	11·44
Sugar and extractive Matters.	4·38	4·02	5·49	1·91	4·85 including albumen.	2·11	2·5	3·67	1·16	1·34	7·5
Casein	3·02	3·02	3·4	8·3	6·16	8·18	10·38	5·65	11·84	5·39	11·15
Albumen	0·19	0·87	Trace	Trace	—	0·5	0·15	1·25	0·99	1·25	0·54
Ash	0·90	0·54	0·45	0·7	1·33	1·004	0·13	0·41	0·36	0·25	0·55
	11·23	11·25	12·5	19·56	17·27	19·88	34·87	13·55	24·4	14.12	31·18
		1·21 Excess.		0·59 Loss.	0·18 Excess.	0·17 Excess.				1·05 Excess.	1·19 Loss.
Volume of Cream after 24 hours.	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{7}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{2}$	—	$\frac{1}{11}$	$\frac{1}{2}$	$\frac{2}{11}$	—
Specific Gravity of the Milk.	1025	1028	1029	1027	1032	1031	—	1031	1040	1027	—

Specific Gravity.—In 28 determinations, the average specific gravity was 1026, the highest being 1040, the lowest 1018. The specific gravity of healthy milk is about 1030, but is liable to vary to the extent of several thousandths. Of the 28 specimens, 11 were between 1027 and 1033, which are within healthy limits, 14 were below 1027, three only were above 1033.

The specific gravity does not seem to bear any definite relation to the quantity of milk which can be drawn from the gland in 24 hours ; from this it would seem that the total quantity of solids excreted in the milk does not remain constant. Thus, in one case, the quantity given in 24 hours was 8 pints, and the specific gravity = 1023 ; another cow gave half a pint, having specific gravity = 1020 ; while a third gave the same quantity, of specific gravity = 1035.

The separation of the milk into *cream* and *skim milk* was effected as follows :—The milk was put into a test tube and left for 24 hours, and the relative volume of the cream noted at the end of that time. The extent of the separation varied very much; in most cases it was very distinct, and the more definite the line between *cream* and *skim*, the more watery and whey-like was the latter. In two cases, however, there was no separation into two parts at all, and it is notable that one of these contained a large quantity of pus, while the other had scarcely any pus corpuscles. Generally speaking, those specimens which contained the largest quantity of pus also gave the largest volume of cream, and separated into two parts most distinctly. Sometimes, when the quantity of pus was excessive, the "cream" sank to the bottom in the form of a thick viscid mass. There is no constant relation between the volume of cream which *rises* and the specific gravity of the milk ; thus, two specimens having the specific gravity respectively = 1018 and 1040, both gave half their bulk of cream. Two specimens having specific gravity of 1020 and 1032, both gave one-third cream. Of two others, both having the specific gravity = 1029, one gave one-half cream, the other one-seventh. The last instance shows that in some cases the *relative* specific gravity of the cream and skim must vary, although the average of the two may be the same ; and this again points to differences in chemical composition, which are, in fact, found to occur ; thus, of two specimens having specific gravity = 1031, one gave half its bulk of cream, and contained 8 per cent. of oil, while the other gave one-eleventh of cream, and contained only $2\frac{1}{2}$ per cent. of oil.

Neither does the specific gravity always vary directly as the total per-centage of solid matters, inasmuch as the relative proportions of *oil* and *casein* vary considerably, so that though the total proportion of solids may be the same in two cases, the relative amounts of these two constituents will produce variations in specific gravity. For instance, a specimen containing about 20 per cent. of solids has specific gravity = 1031, while another contains about $21\frac{1}{2}$ per cent. of solids with specific gravity = 1040, a difference in specific gravity more than would be expected from the slight change in per-centage of solids.

It may be as well to notice that all the specimens of milk (with the exception of three or four which are not characterised by any extreme of specific gravity) were taken from cows at the Royal Veterinary College, *which were all fed in about the same way*, so that the disturbing element of varying diet is not admitted.

In one case which recovered, six different specimens of the milk were examined at intervals of two or three days. The following Table gives the results. The first observation was made when the cow had been ill about five days.

Date.	Quantity of Milk in 24 hours.	Specific Gravity.	Proportion of Cream.	Microscopical characters.
Sept. 14	3 pints -	1021	½	A good deal of pus and some granular colostrum cells: skim very watery.
„ 16	4 pints -	1023	⅛	More pus: fewer colostrum cells.
„ 19	8 pints -	1023	—	Still more pus: still fewer colostrum cells.
„ 22	6 pints -	1026	No cream *rises*. The bulk of the milk sinks to the bottom instead of rising as cream.	A very large quantity of pus, and no colostrum cells. Oil globules of milk very minute.
„ 25	8 pints -	1026	½	Much less *cream*, and the cream contains not more than half as much pus as on the 22nd, so that the total quantity of pus cells thrown off cannot exceed ½ of the quantity formed on the 22nd. Oil globules larger.
„ 28	9 pints -	1029	¼	A few pus corpuscles; no granular cells. Oil globules of normal size.

This case is interesting on account of the sudden and great increase in the pus-like cells, which took place during convalescence, and which as suddenly disappeared. It shows also a steady increase in specific gravity during recovery, while the quantity of milk secreted also increased, so that the total solids discharged in the milk must have increased very considerably between Sept. 14 and Sept. 28.

In one case only (in which the disease was well marked and terminated in death) did the milk contain no pus-like cells, or colostrum cells, at all, and its oil globules were of normal size.

In many specimens the size of the *oil globules* is either greater or less than in healthy milk; this is not always well marked, but in certain cases the difference is extreme.

Sometimes the *oil globules* of diseased milk have a tolerably uniform size, while in other cases they vary very much in the same specimen.

With regard to the chemical analysis: the appearance of the "*sugar and extractive matters*" varied a good deal: generally after drying at 212° Farh. it became quite hard and of brownish colour; in two specimens, however, in turned nearly black, and though it ceased to lose weight at 212° Farh., yet remained sticky and moist. The colour of the oil also varied considerably.

In one case ("*case* 17") the milk was analyzed on two successive days (Nov. 3 and Nov. 4), and though the total per-centage of solids did not vary much (17 per cent. on Nov. 3., 19¾ on Nov. 4), yet the relative proportions of the oil, sugar, and casein in the two is seen to differ considerably on the two days, but the specific gravity remains nearly the same.

There are a few general characters to be noticed by the unaided senses in diseased milk.

The *colour* is often darker than natural, and has a *brownish* tint in addition to the *yellow* colour of rich milk; in one or two cases the milk was abnormally white, and looked almost like chalk. When the proportion of *cream* is large, the *skim* is generally proportionally watery in appearance, so that there must be a greater than ordinary difference between the specific gravity of the skim and cream in such cases; in one such instance the cream had specific gravity =1022, the skim =1027.

When diseased milk becomes sour it has almost always a smell quite different from the odour of the lactic or butyric acid fermentations; it is a very disagreeable animal smell, something like that of an unhealthy ulcer. The reaction of diseased milk for several hours after it has left the body is slightly alkaline, like healthy milk. Milk containing pus does not generally froth so much as healthy milk when shaken.

III.—Of the Morbid Changes in the Tissues and Internal Organs of the Body in Cattle Plague.

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Of the eruption on the skin of the udder.—Of the papillæ of the tongue.—Of the state of the third and fourth stomachs.—Of the villi and glandular follicles of the small intestine.—Of the liver and kidney.—Of the mammary gland.—The brain, spinal cord, ganglia, and nerves.—Muscles.—Bodies resembling entozoa.—Of the contents of the entozoon-like bodies.—Of the structure of the investing membrane.—Tenacity of life.—Conclusions of previous observers.—Of the probable manner in which these bodies reach the muscles.—Of the increase of the germinal matter in the tissues and in the blood.—Of the death and decay of the soft and rapidly formed cells.

A uniform plan has been followed in the preparation of all the tissues and organs submitted to microscopical examination.

After having been soaked in the carmine fluid for a sufficient length of time (varying from three to twelve hours), the tissue was transferred to glycerine, the strength of which was gradually increased, and then soaked in strong glycerine, containing a little free acetic acid, until it regained its original volume. Very thin sections were then made and examined in the strongest glycerine, containing ten drops of acetic acid to the ounce. The germinal matter of those tissues which were injected was afterwards stained by immersion in the carmine fluid, and the specimen treated in the same manner as before. The process is given in detail in "How to Work with the Microscope," 3rd edition, as well as in the new edition of the "Physiological Anatomy and Physiology of Man," by Todd, Bowman, and Beale, page 57.

The skin, mucous membranes, and internal organs and tissues of the body in Cattle Plague exhibit certain general morbid changes, and participate to a greater or less extent in the alterations which have been already described as occurring in the small arteries, veins, and capillaries.

I have assured myself, by special investigations upon the papillæ of the tongue and those of the skin of the mammæ, that the nerve fibres of these organs are not destroyed, and that there is no indication of any structural morbid change which would lead to the inference that the peripheral nervous tissue was the special texture attacked in Cattle Plague, while a careful and patient examination of the nervous centres in one case proved that they also were free from disease, as far as could be ascertained by the mode of investigation adopted. The numerous facts recorded in this memoir agree with the results of general observation, in tending to show that Cattle Plague only influences the nervous tissue as it affects other textures of the body, and that the disease cannot therefore be looked upon as essentially a nervous affection.

Of the Eruption on the Skin of the Udder.—I have examined many specimens of the eruption in various stages, but I have not seen one elevation to which I should apply the term "vesicle" or "pustule." The central part of the slightly conical projection is softer than the adjacent derm, but it does not contain *fluid*, nor have I ever seen one as much raised from the general surface as the vesicles and pustules familiar to us in the diseases of the human skin.

The elevation which was most highly developed of all those I have seen, and which presented the nearest approach to a pustule, is represented in section in Plate II., Fig. 16; *a*, marks the softened central portion, parts of which are represented in Figs. 18 and 19. A minute examination of vertical sections of the cuticle and cutis through the centre of this well marked elevation or papule has enabled me to demonstrate several points of interest which I shall describe as briefly as possible.

The swelling and elevation above the general level of the skin are due principally to a circumscribed increase in bulk of a portion of the derma, but partly to thickening and upraising of the superficial cuticular layers. The swelling in the true skin is in great measure due to the presence of numerous minute particles of germinal matter, wich have evidently multiplied rapidly, and have made their way amongst the fibres of white fibrous

tissue, which are completely invested with them, figs. 18 and 19, and they congregate to form considerable masses in the intervals. The fibrous bundles are in this way slightly separated from one another. After the germinal or nuclear particles have multiplied to a great extent, it is probable that many cease to exist, and are at death resolved into oil globules, myelin particles, and albuminous matter, while others continue to multiply; some of these, I think, gradually make their way without any extensive destruction of tissue, quite to the surface, causing the epithelium to be detached from the papillæ, and continuing to multiply among the cuticular cells and gland-cells, and secretion from the sebaceous follicles, Fig. 26.

At the same time in consequence of the altered conditions the fibrous tissue undergoes change in consistence, and the affected portion becomes very soft and perfectly transparent, and seems to be taken up by the growing germinal matter; much of it thus slowly disappears, and its place becomes occupied by an amorphous mass of minute masses of germinal matter varying much in form, and products resulting from the death and decay of some of these particles. I have seen the elongated nuclei of the bundles of the white fibrous tissue scarcely altered, so that it is not probable that the germinal matter found in such vast quantity originates in these. The connective tissue corpuscles of the indefinite connective tissue appear to have increased in size, and in many sections their germinal matter cannot be distinguished from the surrounding particles. The granular masses may have originated in these bodies, or may have been derived from corpuscles which passed through the vascular walls at an earlier period of the disease. It seems to me probable that much, though by no means all, of the germinal matter seen in such quantity in the substance of the skin is derived from the latter source.

The little arteries in the cutis could be distinctly seen, but they were contracted. Most of the capillaries contained solid matter, and were impervious to injection, but the course of almost all could be traced.

The small veins in the subcutaneous areolar tissue corresponding to the seat of the eruption were filled with small masses of germinal matter, which were evidently undergoing rapid multiplication at the time of death.

The *papillæ* corresponding to the seat of the eruption were examined, and the most important morbid changes discerned were as follows:—

1. The capillaries, though often not much distended, could in every case be traced most distinctly, as they were occupied with masses of germinal matter and granules; even the most minute vessels were quite distinct. Figs. 22 and 27.

2. The connective tissue corpuscles near the free surface of the papillæ were much enlarged, and their processes all contained minute particles of germinal matter, Fig. 21, by which their mode of ramification and their numerous anastomoses might in some instances be traced with the utmost distinctness.

3. Numerous minute masses of germinal matter were seen between the outer wall of the vessel and the surface of the papilla, and here and there these reached to the free surface, and came into contact with the deepest cuticular cells. Fig. 21.

From a careful examination of many specimens, I conclude that the minute particles of germinal matter seen in such great number just external to the capillary originate as follows:—

1. From the division and subdivision of the germinal matter of the connective tissue corpuscles.

2. From particles of germinal matter which passed through the capillary walls from the blood.

And since it is certain that particles which might give rise to them exist in the capillaries while the connective tissue corpuscles are much enlarged, and their processes contain germinal matter, it is probable that the minute particles (Fig. 25) which are seen in such immense numbers, to the multiplication of which the increase in bulk and elevation of the derma, and its softening (pustule?) must be attributed, are derived from both these sources.

The *cuticle*, which is the seat of the eruption, exhibits at various points, but principally about its middle layers, where the cells are flattened and are parallel to the free surface, Fig. 20 *a*, several deep excavations, Fig. 26 *a*, arising from the destruction of the cuticular tissue by the growth of numerous small particles, which occupy the cavities which they have, as it were, scooped out, Figs. 20, 22, 26.

The process of excavation in many instances has gone to such an extent as to have completely destroyed all the normal tissue; it affects the deepest layers, and extends down to the thin layer of connective tissue, which alone separates the capillary of the papilla from the cells of the deepest layers of the cuticle.

The cells of the middle and more superficial layers of the cuticle are affected by the particles of germinal matter, which appear to multiply in the intervals between the cells and invade them from the surface, so that many cells may be found like that represented in Fig. 26 at *b*, in which the ordinary nucleus is still seen occupying the centre, while in the outer part of the cuticular substance are small masses of germinal matter (contagious material?).

As in the case of mucous membrane, the epithelial particles of the deep layers of the cuticle have been supplied with an increased amount of nutrient pabulum, and rapid growth has been taking place in consequence, Fig. 23.

The process which I have described as occurring in the cuticle when an ordinary blister is applied* has been going on here, and the cells have enormously increased in number, while there has not been time for the production of formed material. In the substance or interior of what would be called the pustule I have found no corpuscles which I could call *pus*, and although germinal matter in the deep layers of the cuticle multiplies and gives rise to many rounded masses, which are no doubt direct descendants from the deep cells of the cuticle, these bear a small proportion to the smaller particles of germinal matter already referred to. I have never been able to obtain actual lymph or pus from the elevation, or from any form of the eruption I have met with. The tissue in the centre of the papule is softened, yet by no means fluid, nor so soft as thick viscid mucus.

I feel satisfied that the change in the majority of cases first affects the layer of cuticle immediately above the summits of the papillæ. It is probable that this arises from the escape of the active material from the summits of the papillæ, and its spreading horizontally in different directions between the parallel flattened cells, as shown in Fig. 20. Having reached the parallel layers of the cuticle the particles rapidly multiplying would pass horizontally between the layers, and these would then become partially detached in flakes, Fig. 22, under *b*, Fig 20*a*. If the detached cuticle corresponding to the eruption be examined from its deep aspect and the depressions for the papillæ be brought into focus, the collections of minute particles of rapidly multiplying germinal matter (contagious material?) will be seen without difficulty. The "scab" consists partly of the most superficial layers of the detached and upraised cuticle, partly of sebaceous matter, which has been secreted by the glands, and caused to mingle with the disintegrated epithelium from the surface of the cuticle, but principally of the minute particles of living germinal matter already referred to, and figured in Plate II., Figs. 25, 26.

Minute spherical particles, which I have no doubt are sporules of fungi derived from without, are also to be seen in many cases amongst the superficial cuticular cells; these are represented in 24.

Considering how extremely minute many of the particles of germinal matter in the substance of the cutis and amongst the cuticular cells are, that they occur in collections, that they may be traced from the surface, through the irregular excavations in the cuticle quite to the surface of the papillæ, that minute particles of germinal matter may be seen in the sub-

* Lectures at the Royal College of Physicians, 1861.

stance of the connective tissue of the papillæ themselves, that the capillaries of the papillæ are filled with solid matter, that in this material are numerous masses of germinal matter, and that shreds of fibrine are very frequently observed in the collections of germinal particles above referred to, occupying the spaces in the cuticle; it is at any rate not improbable that the germs from which these minute germinal particles have been derived have passed through the walls of the vessels from the blood.

From what has been stated, it appears certain that the masses of germinal matter entering into the formation of the eruption have the following sources :—

1. The germinal matter of the normal cuticular epithelium. 2. Minute germs of fungi derived from without. 3. The germinal matter of the cells of the sebaceous glands. 4. Germinal matter from the blood, which may have been derived, from *a*, that of the white blood corpuscles, and *b*, the special germinal matter entering the blood from without, which constitutes the contagious poison. It is probable that some of the germinal particles may also be derived from 5, the connective tissue corpuscules; and 6, from the germinal matter of the capillary vessels.

Of the Papillæ of the Tongue.—I have made preparations of the papillæ of the tongue of animals dead of cattle plague, and instituted a careful comparison between these and papillæ from the tongue of the healthy animal prepared in precisely the same manner. The capillaries, nerves, and connective tissue corpuscles, are beautifully displayed in both specimens. The nuclei are all much enlarged and the processes of the connective tissue corpuscles are wider and much more prominent in the Cattle Plague than in the healthy specimen. Compare Figs. 29 and 30, Plate III.

The capillaries of the papillæ contain granular matter, and many have began to shrink, probably after having been considerably distended with blood. In a great number the contents exhibited the same characters as described on page 139.

Many of the capillaries were obstructed, so that it would not have been possible to force injection into them.

The nerves of the papillæ and the mucous membrane were perfectly healthy, except that their nuclei were enlarged.

The superficial cells of epithelium were much altered, and many appeared disintegrated. Amongst them numerous small granular corpuscles resembling those seen in the scabs on the skin were observed, andnumerous vegetable growths were almost constantly met with.

Lungs.—Although the congested patches in the lungs are very general, there are indications of complete obstruction to the circulation only in few spots. I have succeeded in completely injecting many of the capillaries which were extremely distended with blood. Many exhibit distinct diverticula, as represented in Fig. 28, Plate III., and in some, corpuscles resembling white blood corpuscles were very numerous. Here and there some capillaries were found, in which the blood was stagnant.

The masses of germinal matter connected with the capillary walls were large and in some cases had divided and subdivided into small portions. In the interior of some of the capillaries small particles of germinal matter were seen, but in no case have I observed in the vessels of the lungs morbid changes advanced to the same extent as in many other vessels.

An extremely emphysematous condition of the lungs is one of the morbid changes most constantly observed in Cattle Plague. I am unable to give a satisfactory explanation of this change, but it seems probable that it may depend upon impediment to the free egress of the air from the air cells of the lungs resulting from the congested state of the capillaries of the smallest bronchial tubes, the tumid condition of the mucous membrane, and the accumulated secretion upon its surface. The altered blood would also exert a deleterious influence upon the afferent nerves concerned in exciting the reflex respiratory movements, which, as is well known, soon become exceedingly feeble, and remain so until death occurs.

The emphysematous condition usually extends to the areolar tissue between the lobulets; the bands of white fibrous tissue and the cords of yellow elastic tissue being beautifully distinct in the highly stretched texture.

The distended air cells presented nothing remarkable. There was no evidence of degeneration in the pulmonary membrane, no attenuated, granular, and otherwise altered capillary vessels, such as are observed in cases of chronic emphysema in the human subject. The cells in the air cells were larger and more numerous than in health, and blood corpuscles and granular matter were present, Plate III., Fig. 38. The epithelial cells, however, contained many minute globules of myelin, Plate III., Figs. 37, 40.

Of the State of the Third and Fourth Stomachs.—The *omasum* or *manyplies* which I examined, although from a very bad case of disease, did not exhibit very prominent morbid appearances. The vessels in part were congested, but the Prussian blue fluid penetrated the capillaries readily, though not equally, some being stretched to the utmost, while others were exceedingly narrow, and only contained a narrow line of injection. Many exhibited dilatations, and in those immediately beneath the epithelial surface numerous little diverticula were observed in the thickness of the wall of the capillary. These reached the under surface of the epithelial investment.

The Fourth Stomach.—It would be a mere repetition to describe the general changes which have taken place in the vessels, connective tissue, and epithelial surface of the fourth stomach or *reed*, but I propose to refer briefly to the alterations which have occurred in the seat of the superficial depressions upon the surface of the mucous membrane, looking something like superficial ulcers, but in which there is no true ulceration. The appearance seems to be due to a general shrinking of all the textures entering into the formation of the mucous membrane. This shrinking I attribute to the supply of nutrient pabulum having been for some time diminished, and at length cut off, in consequence of the blood having stagnated in the vessels at an earlier period of the disease.

I have preparations in which the gastric glands corresponding to these depressions are much reduced in volume, and their cells shrunken and few in number, while in other parts of the same stomach the glands are well developed, and the cells larger than in health. The vessels corresponding to these patches have already undergone important changes, and of some nothing but mere lines remain. Their outline is irregular, exhibiting here a bulging and there a constriction, while the contents are perfectly pale and granular without a trace of the red colouring matter of the blood, Plate III., Figs. 32, 34. The normal epithelium upon the surface of the mucous membrane has been removed, and only a little granular matter with a few small cells can be discerned. The submucous areolar tissue is contracted, and exhibits a granular appearance. In its substance are numerous small masses of germinal matter, oil-globules, and myelin particles. The vessels and connective tissue in which they lie are represented in Fig. 32. The deep vessels of the mucous membrane are also shown in the drawing, as well as the openings of some of the gastric glands with their contained cells. A portion of one of the larger vessels is figured in 34, and in 33 a portion of one of the smallest capillaries with minute particles of germinal matter, the nature of which is doubtful, in its interior.

Of the Villi and glandular Follicles of the Small Intestine.—The villi, like other parts of the mucous membrane of the small intestine, are highly injected. The granular cells in the substance of the villus are large and very numerous, and the mass of germinal matter (nucleus) of the columnar cells is much larger than in cells in a normal state. In many cases the columnar cells are completely removed. Amongst them, particularly at their attached surface, and upon the surface of the villi on which they lie, are numerous small masses of germinal matter, for the most part of a spherical form, but amongst these are many more

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minute masses apparently of the same character, and multitudes of these are found among the contents of the small intestine.

The cells of the follicles of the small intestine are enlarged, and their nuclei are much larger than natural.

The mucus on the surface of the duodenum was of a pale brown colour. It was viscid, and contained numerous spherical granular masses, small granular particles of germinal matter, altered blood corpuscles, brownish bodies, apparently collections of altered blood corpuscles, numerous vegetable organisms like those figured in Plate III. Fig. 31.

It is very interesting to examine carefully a specimen of the mucous membrane of the small intestine which has been successfully injected with the Prussian blue fluid injection. The colouring matter can be traced to the exact point where the capillary is obstructed by the altered blood in its interior, so that it seems beyond question that the obstruction, which soon becomes complete, must have arisen from changes occurring in the blood in the narrowest part of the capillary channels.

In the specimens subjected to examination I feel quite sure that a vast number of the villi were actually disorganized at the time of death, and that under no supposable circumstances could the circulation have been re-established in many of the capillary vessels. When such an extent of the surface concerned in the absorption of nutrient matters is destroyed all hope from treatment is over, and it is obvious that when a large number of the villi are destroyed the death of the animal cannot be averted.

In no tissue in the body is the obstruction more complete or diffused over a wider extent than in the stomach and small intestine, and in the instances of disease which I have examined the obstructed capillaries in the intestines were more numerous than in the stomach.

This complete obstruction of the capillary circulation in spots over a considerable tract of mucous membrane is a matter of the greatest interest in connexion with the very fatal character of Cattle Plague. One would have concluded that all remedial measures would have been useless as soon as these local congestions had occurred in considerable number.

In the connective tissue beneath the altered patches of mucous membrane of the fourth stomach, and very commonly in the submucous areolar tissue of the greater part of the small intestine, are numerous sperical and oval masses of a reddish brown colour. Many of these appear to be composed of smaller masses, and are as much as the $\frac{1}{1000}$ of an inch in diameter, and some are still larger than this. The surface is perfectly smooth. Several are sometimes seen in the course of what was evidently once a capillary vessel, but many are often situated just external to capillaries. I think these bodies are collections of red blood corpuscles much altered, but I am not certain that all are of this nature, some look very like vegetable organisms. I have seen them in the substance of the solitary glands and also in the villi, in cases of Cattle Plague.

I have some beautiful preparations showing portions of Peyer's patches. The vessels of these individual glands are not so much altered as those of the villi immediately over them. Nerve fibres can in many instances be seen ramifying over the gland. The glands contain numerous little spherical particles of germinal matter, but they are not larger than in the normal state. I feel quite sure that the morbid changes essential to and characteristic of the intestine in this disease do not commence in or mainly affect these glands.

Of the Liver and Kidney.—Neither the nuclei of the liver cells nor those of the walls of the hepatic vessels and connective tissue seem to be enlarged to the same extent as the nuclei in other textures. I have sections of liver which I might not be able to distinguish from sections from perfectly healthy animals.

The vessels of the kidney were not much congested in the specimen I examined. Artificial injection for the most part ran well, but the small vessels of some of the Malpighian bodies were completely obstructed, so that in sections from an injected specimen several Malpighian bodies were not injected at all.

In many instances the Malpighian bodies of the uninjected kidney of an animal killed by Cattle Plague were larger than those from a healthy kidney. It was found that twenty-five healthy Malpighian bodies in the Cattle Plague kidney measured nearly one-third more in diameter than the same number in a healthy kidney, but it must not be forgotten that in healthy slaughtered animals a little variation is observed in the diameter of the Malpighian bodies, so that I am not disposed to attribute much importance to this observation.

In such a condition as Cattle Plague, where it seems obstruction to the flow of blood commences in the capillary vessels in consequence probably of some change in the blood itself, one would not expect to find the capillaries of the liver or the intertubular capillaries of the kidney congested. The stagnant state of the blood in the capillaries of the intestine would impede the onward flow of blood towards the portal vein, and the liver would therefore contain less blood than in the normal state.

The blood flowing to the kidney through the renal artery being impeded in the first set of capillaries which it had to traverse, namely, those of the Malpighian body, would only reach the intertubular capillaries in small quantities. The Malpighian capillaries would at first be highly congested. The congestion would then, to some extent, be relieved by the escape of blood, serum, and corpuscles, which would pass into the urine. When the circulation ceased changes would ensue in the clot resembling those occurring in other vessels. In Plate I. Fig. 7. a loop of capillaries of a Malpighian body with its contents is represented magnified 700 diameters. The small particles represented in the interior of the vessel amongst the white blood corpuscles were coloured by the carmine fluid, and I believe them to be particles of the contagious material which are growing and multiplying rapidly.

Of the Mammary Gland.—I have examined two or three mammary glands, but have made out nothing specially bearing upon the nature of the disease. Some beautiful specimens have been prepared, and the vessels minutely injected, but as I have never been able to obtain a cow's udder taken from an animal in perfect health, and giving plenty of milk, no comparison can be made. There were no morbid changes in the mammary glands which I examined worthy of being recorded. The activity of circulation through the vessels of the gland becomes diminished at an early period of the disease, probably from contraction of the small arteries induced through the influence of the nerves; we should not, therefore, expect to find the changes proceeding to the same degree in the capillaries of this organ as in those of other tissues, especially those of the surfaces from which morbid materials are ordinarily eliminated.

The Brain, Spinal Cord, Ganglia, and Nerves, have been minutely examined in one instance, and, with the exception of the nuclei being very large and distinct, little has been noticed. Many of the vessels of the pia mater, and most of those of the choroid plexuses contained blood, and in many of the small veins and capillaries the changes observed in the contents of other vessels had also taken place (see page 132).

Muscles.—The general appearance of the voluntary muscles of the system in Cattle Plague is variable, and in some parts of the same animal muscular tissue may be discovered which could not be distinguished by the unaided eye from the beef of animals slaughtered in health. In other situations, portions of muscular tissue may be seen which are almost black from the effusion of blood between the elementary fibres, while in some places the flesh is almost colourless, and so soft and rotten that it may be readily broken down with the slightest pressure. Such differences would be anticipated in any disease characterized by local obstructions in the capillary circulation, and the difference of the appearances of the muscular tissue in different

animals, and in different parts of the same carcase, depend upon the altered character of the fluid which has transuded from the blood vessels, the degree of derangement of the capillary circulation, and the period of time these altered circumstances have lasted.

It is impossible that deranged capillary circulation, such as undoubtedly exists in Cattle Plague, whatever the cause of its production may be, could long persist without giving rise to alterations in the appearance of the muscular fibres. In some muscles the elementary fibres appear softened, translucent, and wax like, colourless, and almost destitute of transverse markings, the nuclei having disappeared; whilst in others the tissue is harder, though more brittle than usual, and the transverse striæ are unusually distinct. I have also noticed the tendency to transverse cleavage and splitting of the elementary fibre into Bowman's discs to be much greater than in healthy muscle. It is not uncommon to meet with elementary fibres the sarcous material of which has divided transversely within the tube of sarcolemma into a number of segments, often separated from one another by considerable intervals. In these cases it looks as if the contractile material had been suddenly ruptured at short intervals, in consequence possibly of the extreme violence of contractions simultaneously induced in it at short intervals throughout the entire length of the elementary fibre. The appearances above referred to exactly resemble those delineated long ago by Bowman in muscular fibres from cases of tetanus. In other elementary fibres the contractile material seems to have been split up into comparatively small portions, which are transparent, the edges being often rounded and smooth; transverse markings are only to be seen indistinctly here and there, and all trace of definite structure has been lost. I have also seen fibres the contractile tissue of which appeared perfectly granular, and in some cases numerous minute oil globules were present. It would not have been possible, however, to have distinguished some of the elementary muscular fibres from some very bad cases of Cattle Plague from those of perfectly healthy animals.

The masses of germinal matter of the voluntary muscles, like those of all other tissues, are considerably enlarged in cases of Cattle Plague. And in many elementary fibres the increase is very great indeed, those belonging to the sarcous tissue being globose, exhibiting distinct protrusions or diverticula in various parts, and in many cases three or four large masses resulting from the separation and growth of such protrusions, buds, or offsets, take the place of one of the normal spindle-shaped nuclear bodies, Plate III., Fig. 42. The masses of germinal matter connected with the sarcolemma, and those belonging to the nerves, capillaries, and intermuscular connective tissue, have all increased in size. These changes depend no doubt upon the increased transudation of nutrient fluid from the blood, and vary in intensity in different parts, according to the degree of impeded circulation.

But as the appearances above described, and many others of a less important character which might be dwelt upon, are in all probability but the result of the altered composition of the blood, the altered state of the circulation, and the local capillary congestions, and probably are by no means peculiar to Cattle Plague, it is not desirable to treat of them at length.

Bodies resembling Entozoa in Muscles.—But the most remarkable circumstance which I have observed in connexion with the muscular system of animals destroyed by Cattle Plague is the occurrence of a number of very distinct spindle-shaped bodies, each embedded in the sarcous tissue of an elementary fibre. I have also, but in a few instances only, seen similar bodies lying free amongst the elementary muscular fibres. They have been found in considerable number in the muscles of every animal dead of Cattle Plague in which I have sought for them, with one exception,* and in all the different muscles examined from a single carcase many have been found. They are commonly met with in large numbers in the muscular fibres of the heart,† but they attain a more perfectly developed form and a much larger size in the muscles of the system. These bodies are exceedingly distinct; they vary much in size, the smallest being not more than the $\frac{1}{3000}$ of an inch in length, and the largest as much as the $\frac{1}{4}$. They invariably exhibit certain common characters. There is little difficulty in finding them if only very small pieces of muscular tissue be subjected to examination, but being very transparent they are easily hidden from view if surrounded by several elementary muscular fibres, and thus they may escape detection. They vary in number, and I should think that in some cases I have seen them as numerous as one to at the most twenty muscular fibres, while in others perhaps they may not be found in greater number than in the proportion of one to a hundred muscular fibres. The smallest are oval, but as they grow they become spindle-shaped, and usually one end is pointed, while the opposite extremity is more or less rounded, Plate IV., Figs. 49, 55. In some there are slight projections from different parts of the surface as if there were tendency to the formation of segments or lateral pores, Figs. 53, 54; but in the larger ones the outline appears perfectly uniform. In all there is a distinct investing membrane of a peculiar structure, varying in thickness in bodies of different sizes, the outer surface of which is in contact with the sarcous tissue, or with the sarcolemma, save in the few instances in which the bodies are free. Even when the peculiar bodies lie embedded in the sarcous tissues, being surrounded on all sides by a thin layer of it, the transverse markings of the contractile material are perfectly distinct, Figs. 50 at *a* and 55. The masses of germinal matter of the affected tissue are not larger than those of adjacent muscular fibres. There is no evidence of granular, fatty, amyloid, or other form of degeneration. And whatever these peculiar bodies may eventually be proved to be, it is certain that they grow within the contractile material, and by their growth excite no irritation. The muscular tissue in contact with them seems, as it were, slowly to make way for their increased growth without the occurrence of inflammation, or any other morbid change.

Structure of the Investing Membrane.—Not the least interesting point in connexion with these curious bodies is the investing membrane, and it is very desirable to draw the attention of helminthologists to its anatomical characters.

The tissue is very transparent, and varies somewhat in thickness in different parts. It appears to exhibit delicate transverse markings, but upon careful examination it is found that these are caused by the linear arrangement of minute hair-like fibres. These processes of the investing membrane were described by Mr. Rainey in his paper in the Phil. Trans. for 1857.† He says they increase in size and distinctness as the animal grows larger. "They have not the sharp and well "defined outline of true cilia, nor are they pointed "like setæ, or curled like cirri." In a specimen in my possession, however, the bodies in question are certainly pointed, and the whole appearance under a power of 1,000 diameters, is such as would result if the investment consisted of very delicate transparent conical hairs, terminating outwards in pointed processes. After lying in water for some time the projecting filaments exhibited the usual characteristics of cilia, and would no doubt have been termed cilia by any naturalist. The structure of this membrane is so beautiful and delicate that it might be employed as a test object for estimating the defining power of object glasses.

The peculiar structure of the external investment covering or sheath will be understood by reference to Figs. 49 to 54, and I shall not here enter into a more

* The exception was an undoubted case of Cattle Plague, the post mortem examination of which was witnessed by Professor Brown, of the Veterinary Department of the Privy Council.

* Attention was drawn by Dr. Fenwick to the existence of these bodies in the muscles of animals dead of Cattle Plague, in a letter to the "Times" of Jan. 3rd, 1866.

† On the structure and development of the cysticercus cellulosæ, as found in the muscles of the pig.—Phil. Trans. vol. 147.

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minute description of it. I regard it as a peculiar formation, and feel quite certain that the appearances do not result from any modification occurring in the layer of sarcous matter which was in immediate contact with the body under consideration during its increase in size.

Of the Contents of the Entozoon-like Body.—The contents of these spindle-shaped bags, cysts, or investments without doubt form the most important part of the mass and are well worthy of the most attentive consideration. When examined by a low power, the matter occupying the cavity appears granular, and there are distinct indications of the mass being subdivided into smaller portions, the divisions being most distinct transversely. I do not think there are distinct septa, but the appearance is such as would result if each of a number of masses of germinal matter in the interior of a cavity with extensile walls were to divide and subdivide into numerous masses, each capable of further growth and subdivision. The appearance is given in Figs. 49 and 55.

The entire contents of every one of these bodies I have seen exhibit the same characters. There is no indication of alimentary canal, ovary, secreting gland, or other organ. It is therefore only necessary to call attention to the small individual particles of an aggregation of which each of the peculiar bodies in question entirely and invariably consists.

When perfectly mature each individual little corpuscle is curved, one extremity being rounded, while the other is almost sharp, as represented in Plate V., Fig. 62, at *b*. These particles are for the most part of an oval form, or spindle-shaped. They are flattened, and apparently consist of a transparent material, which exhibits here and there spots differing in refraction from the rest of the mass. These are irregularly disseminated through the substance, and give to it a granular appearance when it is examined by low powers, but under the influence of high magnifying powers the appearance is such as to render it doubtful, if, at least in all cases, these are actual granules distinct from the general mass. Figs. 50, 62, 63, and 64.

The bodies approximate to one another very closely in dimensions, but it is difficult to find two of precisely the same figure, and it seems to me most probable that they change in form when they escape into the surrounding fluid by the rupture of the sac, Figs. 50, 60, 62. A general idea of the characters of these little bodies when examined under different magnifying powers may be formed by reference to Plates IV. and V., especially Figs. 48, 53, 49, 50, 62, 63, from specimens magnified respectively 25, 130, 215, 700, 1,800, and 2,800 diameters.

In their general appearance these bodies so closely resemble the nuclei of tissues that under low powers one might easily be mistaken for the other. But upon careful examination by the highest powers it will be found that the outline is sharper, that the general mass is more uniform, while the differences in form are greater than are observed in muscle nuclei. Moreover these bodies are often seen in such great number (fifty, or a hundred, or more being in the field at one time,) that they cannot be mistaken for nuclei. They are also smaller than the nuclei of muscle, and very much smaller than the greatly enlarged muscular nuclei seen in the muscles of animals destroyed by Cattle Plague.

Upon the whole it seems to me almost certain that each of these little bodies is capable of giving rise to others like itself, by division and subdivision, and these to more in the same way. To what extent this process is capable of being carried I can form no idea. The spindle-shaped elongated cysts in which these particles grow and multiply sometimes reach a very great length. In a specimen of muscle I received from Dr. Eade, of Norwich, I found two as much as the quarter of an inch in length, and yet so narrow that the muscular fibres in which they lay still exhibited their normal diameter. Up to a certain size, however, as the bodies increase in length they also increase in width, and I have seen some twice the diameter of an ordinary muscular fibre. In some of the largest of these the walls were not so thick as in many smaller ones which have fallen under my notice. From the facility with which the contents of many of these bodies escape, very slight pressure of the thin glass being often sufficient to rupture the cyst, Fig. 53, I think it probable that after the aggregate mass had attained a size somewhat larger than those delineated in my drawings, it might burst, in which case hundreds of thousands of the small oval bodies would be set free among the vessels and nerves, and connective tissue lying between the elementary muscular fibres. But this is only a supposition, and I have no data enabling me to determine what would become of these particles if set free. The death of the animal always seems to occur before this catastrophe happens. There is, however, another mode of escape for the bodies contained in these spindle-shaped cysts which is possible. Although I have never seen a distinct pore or aperture in any part of the cyst, it seems not improbable that an orifice might be formed at one or other extremity, or at a point of the body where the external wall is thinner than in other parts. In this way the escape of these bodies from their parent cyst a few at a time would be effected, while the process of multiplication still going on within would not be interfered with. But whether the individual masses are able to migrate from one part of the body to another, or after having been produced in enormous number within the cyst, they are destined to remain dormant until by the death of their host opportunity for a far more distant migration is provided; or whether, as is perhaps upon the whole least probable, from the collection already described a true entozoon is evolved, must be determined by future research.

Tenacity of Life.—The little bodies in question are very tenacious of life, and they are not permeated by the carmine fluid till long after every mass of germinal matter (nucleus) of the muscles, vessels, and nerves have been deeply coloured,—a fact which shows that at any rate these bodies are quite distinct from the muscle nuclei, and have not descended from them. After remaining for many hours in the carmine fluid they take the colour like every other kind of living matter, and several specimens exhibited one spot darker than other parts.

I have tried some experiments in the hope of causing these bodies to multiply, but my attempts have hitherto failed. I placed pieces of muscle in which the entozoa-like bodies were very numerous in artificial digestive fluid prepared from the pig's stomach, and also in a fluid prepared from the fourth stomach of the ox, at a temperature of 100° F. for 24 hours. Although many of the bodies had considerably increased in size there was no evidence of movement or of the formation of buds, and I think that the increase in size may, perhaps, have been due to imbibition merely, Fig. 64. They were not much altered in general appearance or refractive power, while the nuclei of the tissues were very much changed by the digestive fluid. The smooth and delicately granular appearance of the latter was removed, and numerous small oil globules had formed in them.

I placed another portion of the same muscle in fresh alkaline serum from ox blood at a temperature of 100°, and another in some of the same serum, rendered slightly acid by the addition of acetic acid. Many of the little oval particles had escaped from their cysts, but after the lapse of 24 hours had undergone no appreciable change. In water the bodies may remain for several days without undergoing much change. It is therefore necessary to perform many other experiments with the view of ascertaining the nature and origin of these peculiar bodies. Some which have suggested themselves are already in progress, and if any results are obtained they shall be communicated.

Conclusion of previous Observers.— Professor Siebold states that these peculiar entozoon-like bodies were first discovered by Miescher in the muscles of a mouse in 1843. Hessling* found them in the muscular

* Siebold and Kölliker's Zeitschrift Band. v. p. 197.

fibres of the heart of the sheep and ox. They have been also found in the deer by Siebold and Bischoff. They have been seen in the muscles of the mouse and rat. The latter observer found them in all the muscles of a rat in 1845. In 1855 Rainey* found and figured similar bodies in the muscles of the pig, and inferred that they represented the early period of development of the *cysticercus cellulosæ* of that animal, but later writers, and especially Leuckart and Cobbold, do not consider the evidence upon which this inference rests at all conclusive.†

The form of the body and the peculiar structure of the external investing membrane, would lead one to regard the bodies as some species of entozoon in an imperfect stage of development, but from the character of the contents it is possible that some zoologists might consider them more closely allied to the gregarinæ or psorospermiæ. There is, I think, no doubt that these bodies are of an animal nature, but I am not aware of any gregariniform body exhibiting either the form or considerable size or general characters of those in question. There is, I think, no character that renders it at all probable that they belong to the vegetable kingdom.

The nature of these very peculiar and striking bodies has not yet been made out, and although it is probable that they may have nothing whatever to do with the Cattle Plague the constancy of their occurrence in very large numbers in the muscles of animals that have died of this disease is remarkable. Moreover, as there can be no doubt that minute bodies, capable of rapid multiplication far less than those forming the contents of the spindle-shaped cysts, would be competent to give rise to very serious symptoms if they passed from the intestinal canal into the vascular system, it seems of the utmost importance that the natural history of these bodies, whatever their nature may be, should be traced out.

Of the probable Manner in which these Bodies reach the Muscles.—From the foregoing observations it seems almost certain that these bodies are special organisms derived from organisms of a like kind, and that they did not *originate* within the body of the animal they inhabit.

Although I have not yet succeeded in demonstrating the earliest changes occurring in the mass soon after its entrance into the muscular fibre, its position in the central part of the sarcous tissue in many instances, its increase in length and breadth as proved by the different dimensions of the specimens observed, and the small size of many of them, render it almost certain that a very small mass must have originally made its way into the sarcous tissue, while the demonstration of a fissure leading from the external surface of the fibre to its central axis, where the organism is situated, Fig. 54 at *a*, seems almost conclusive upon this point. It is almost impossible to resist the inference that a minute germ, perhaps less than the $\frac{1}{10000}$th of an inch in its smallest diameter, makes its way through the sarcolemma into the sarcous tissue, and grows there, ultimately giving rise to the body described and figured.

The smallest I have been able to demonstrate with absolute certainty are represented in Figs. 57 and 58. The one delineated in Fig. 58 is only the $\frac{1}{3000}$ of an inch in length, and is probably very young. In Fig. 60, one not more than the $\frac{1}{2500}$ of an inch in length has already attained its peculiar form, and the little bodies within, now less than the $\frac{1}{5000}$ of an inch in diameter, are multiplying by division.

The difficulty of observing the earliest changes taking place in such a minute mass in the centre of an elementary fibre must necessarily be much increased by the circumstance of the multiplication of the muscular nuclei themselves in many of those cases in which the bodies in question are observed. I have indeed seen many specimens which I might have fairly adduced as the earliest stage of the intramuscular existence of the organism, but have refrained from figuring these because I could not positively affirm that they were not collections of three, four, or half a dozen muscular nuclei.

All the evidence yet obtained is indeed strongly in favour of the view that one of the very large bodies figured is developed from a very minute mass, resembling if not identical in nature with the little bodies forming the contents of the spindle-shaped cysts. The largest of these are not more than the $\frac{1}{2000}$th of an inch in length, and therefore not larger than a white blood corpuscle. But in the smallest cysts, and in the pointed extremity of the largest, it is common to find particles far more minute than these. Looking at the character of these bodies, and bearing in mind what is known to occur in the multiplication of masses of germinal matter generally, (see "The Structure of the Tissues," and my lectures recently published in the "Medical Times" and "Gazette,") it is reasonable to infer that these bodies may be developed from particles of extreme minuteness, so small that they would readily pass into or out of a capillary through its wall, and it is very probable that the stage of existence which we know of may be preceded by one in the blood, in which these particles certainly are less than the $\frac{1}{10000}$th of an inch in diameter, and undergoing rapid multiplication. Seeing that these bodies grow and multiply in immediate contact with the muscular tissue without exciting inflammation, or leading to any marked degeneration, it is not unreasonable to assume that they, or smaller particles from which they are derived, might circulate in the blood without destroying the life of the white blood corpuscles, and without necessarily causing coagulation of the fibrin.

The most minute particles represented in Fig. 56 are probably particles which might have grown, and assumed the form of those represented in Figs. 43 to 48.

From a consideration of the facts already adduced the following hypothesis might suggest itself to the reader. Germinal particles of minute size, capable of being easily transported by air, suspended in fluids, or carried by the smallest insects, reach the mucous surfaces of the animal, where, meeting with nutrient matter, they soon increase and multiply; some pass through the vascular walls into the blood. Multiplying in those parts of the vascular system where the circulation is the slowest they might soon give rise to congestion, and otherwise derange the circulation, and affect local nutrition. Many might escape through the vascular walls, and growing and multiplying, seriously disturb the nutrition of the epithelium, and gradually lead to complete disorganization of the epithelial surface, and the tissue upon which the epithelium rests. Some, gaining access to the particular tissue in which they are destined to pass another phase of their development, the interior of a muscular fibre, might there attain the character of the bodies described. Still, in an immature condition, they may await the opportunity for another migration, after which perhaps they assume their fully developed form.

It will, however, be asked if there is any evidence from which an opinion can at once be formed concerning the relation of these bodies to the Cattle Plague.

1. Are they the cause of the disease?

2. If not the direct cause of the disease, can they so derange the health of the animal as to predispose it to take the affection?

3. Is their presence in Cattle Plague merely accidental?

The first question may be answered in the negative, but in the present state of our knowledge it is, I fear, impossible to reply positively to the second and third questions. The great number of the entozoon-like bodies in the pig and sheep, and the fact of their having been found in many other animals, is certainly strongly against the view that they are specially connected in any way with the Cattle Plague, and it is almost certain that they do not grow and multiply so rapidly as to attain the size and reach the very large number actually found in the muscles in the course of a fortnight.

* "On the structure and development of the cysticercus cellulosæ, as found in the muscles of the pig," by George Rainey, M.R.C.S.—Phil. Trans. vol. 147, p. 111, 1857.

† For a full account of the literature of this subject the reader is referred to a paper by Dr. Cobbold in the Lancet for January 7th, 1866, which has been reprinted by Professor Gamgee in his large work on the Cattle Plague.

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It seems possible that such bodies when present in great number in the muscles of the system might give rise to derangement of the health, and perhaps predispose the animal to attacks of acute disease, not only by exciting fever during their migration from one part of the body to another, but by interfering in many other ways with the general nutritive operations. Nor is the general state of health and bodily vigour of our flocks and herds such that we should dismiss the striking facts advanced with reference to these bodies with little notice. They may have a more important bearing upon some of the affections of cattle than would appear probable upon first consideration.

The facts concerning these worm-like bodies may be summed up as follows :—

1. That in almost all, if not in all, animals dying of Cattle Plague, entozoa or entozoon-like bodies exist in considerable number in the voluntary muscles of the system and in the heart.

2. They are occasionally found, but in comparatively small numbers, in animals apparently in perfect health when killed.

3. These or closely allied species have been known for more than 20 years, but their nature has not yet been determined. They have been found in the ox, sheep, deer, pig, rat, mouse, and perhaps other animals.

4. In the muscles of a calf killed by Cattle Plague, under *six months* of age, these bodies were found in immense numbers.

5. They vary in length from less than the $\frac{1}{3000}$ of an inch to at least a quarter of an inch in length. They are, for the most part, embedded in the contractile material of the elementary muscular fibre, but they are occasionally found free.

6. They are for the most part spindle-shaped, and the external investment or envelope exhibits a very delicate and peculiar structure, being completely covered with delicate hair-like processes.

7. The mass within appears granular to low powers, and exhibits a division into numerous segments, but it is found to consist entirely of minute bodies resembling one another, possessing very definite characters, less than the $\frac{1}{3000}$th of an inch in their longest diameter, and of peculiar form, being oval, flattened, the body slightly curved laterally, with one extremity blunt, and the other rather abruptly pointed.

8. The entire worm-like mass increases in size as these small bodies multiply in number, probably by division and subdivision, within the cyst.

Of the increase of the germinal matter in the tissues and in the blood.—The increased formation of germinal matter in the cells upon the surface of the skin and mucous membranes results from the increased proportion of nutrient material transmitted to them consequent upon the congested state of the vessels, and the slow movement of the blood through them. In the same way, I believe, the increased formation of mucus corpuscles, which consist entirely of germinal matter, upon the surfaces of the air passages is to be explained. In both cases not only is there an increased formation of germinal matter upon the surface, but all the glandular follicles of the mucous membrane participate in the increased action, and in every follicle an increased formation of the gland cells occurs, and these often escape from the orifice in considerable numbers. At least two different kinds of anatomical elements will, therefore, be found upon the surface of the mucous membrane, upon which glandular follicles open :—

1. The epithelial cells formed upon the surface ; and,

2. The cells formed within the glandular follicles.

And both elements will be found to exhibit modifications in character, the proportion of germinal matter to the formed material being invariably greater than in health. Sometimes the pouring out from the follicles of viscid matter, consisting almost entirely of spherical masses of germinal matter, will increase to such an extent as to spread over the free surface of the epithelial investment of the mucous membrane, and extend for some distance around the orifice of the gland. In some instances where coagulable material, with or without blood corpuscles, escapes from the vessels into the glandular follicles, this may, after issuing from the mouth of the follicles, spread over the surface and form a firm false membrane, which may be removed in thin flakes, like that which is formed in some cases of diphtheria.

So that on the free surface of any mucous membrane, the vessels of which are highly congested, there may be masses of germinal matter having a very different origin. 1. Particles formed from the epithelium of the surface. 2. From that of the glandular follicle. 3. From the blood. It will be important to bear this in mind if an attempt be made to determine which are the actual contagious elements in the secretions found upon the mucous and other surfaces in Cattle Plague.

The increase of the germinal matter in connexion with the vessels, nerves, connective tissues, and, in short, all the textures of the body observed so generally in animals which have died of the Cattle Plague, is probably due to the supply of an increased quantity of nutritive pabulum, and this is brought about by—1. The thinning of the vascular walls resulting from the distension of the vessels and the increased transudation of soluble matters ; and 2. The increased proportion of soluble matters existing in the blood consequent upon alterations previously induced in that fluid.

Just as the locally increased supply of nutritive pabulum to the mucous and cutaneous surfaces causes an increased formation of epithelium, in which the proportion of germinal matter to the formed material produced, is far greater than in the normal condition, so in internal parts similar phenomena give rise to corresponding results, and the germinal matter of all the textures is found increased in proportion.* Even the masses of germinal matter (nuclei) of the adipose vesicles are considerably increased in size. In one specimen the diameter of these nuclei was nearly three times that of nuclei of adipose tissue taken from the healthy ox. The increase is general throughout the body, but in those spots in which the circulation has been the slowest, and the transudation of nutrient pabulum the greatest in proportion to the space to be nourished, the increase is so remarkable that the texture quite loses its normal appearance, and instead of the usual anatomical elements being slowly produced, spherical masses of germinal matter varying in size, some of which would be termed "*granules*," others "*free nuclei*," others "*spherical or granular corpuscles*," or perhaps even "*pus corpuscles*," result.

The germinal matter of which the white blood corpuscles are composed participate in the increased nutrition which affects the germinal matter of the vessels and tissues of the body. They increase in size, and, in the smaller vessels, considerably in number. These alterations are probably to be demonstrated in all fevers and diseases allied to Cattle Plague. This increase in the germinal matter of the white blood corpuscles continues after the circulation has been brought to a complete standstill, and, as already remarked, in some cases the contents of small veins seem to be almost composed of small masses of germinal matter Plate I. Fig. 9. It may be remarked that under circumstances favourable to their growth, and especially when the movement of the blood is slow, the white blood corpuscles absorb nutriment and increase considerably in size. Thus we have a general change brought about by abnormal conditions exactly resembling that which occurs in certain parts of the organism in a normal state, for example, in the spleen pulp, where a number of cells like very large white blood corpuscles are always being formed.

As is well known, a clot in the interior of a vessel may undergo what has been termed *softening*. But this so-called softening really consists in the multiplication of the masses of germinal matter constituting the white blood corpuscles, or particles smaller than

* See my lectures delivered at the Royal College of Physicians in 1861, and those on the subjects of Nutrition and Inflammation in the Medical Times and Gazette, 1864.

these which are to be detected by the aid of very high magnifying powers. These masses of living germinal matter live at the expense of the softened fibrin and other constituents of the blood clot, which they appropriate, and thus a substance closely allied to pus, consisting of masses of living germinal matter, may be produced under certain circumstances from a clot of blood or fibrin, the pus-like corpuscles being, in fact, the direct descendants of the germinal matter of the blood.

Of the death and decay of the soft and rapidly formed cells.—But the modified epithelial and other cells resulting are, as would be supposed, softer in consistence, more spherical in form, and far less regular in their arrangement than the normal cells. Although they no doubt continue to increase rapidly so long as they are freely supplied with pabulum, those which are gradually removed further and further from the vascular surface are prevented from multiplying, and therefore tend to pass into rapid decay, like all other quickly-formed structures. Some of their constituents become decomposed, and fat, and numerous myelin particles, result. This change is very common in the cells upon all the mucous membranes in Cattle Plague, and some examples are represented in Plate III. Figs. 37, 40. The soft cells also form a nidus for the multiplication of countless vegetable germs which are seen in immense numbers amongst the softened and altered epithelial particles which accumulate in such great number on the mucous surfaces; several are represented in Plate II. Figs. 13, 7, and Plate III. Fig. 31. It must not be supposed that these vegetable organisms, growing and multiplying so rapidly in and amongst the decaying epithelium, are peculiar to this or to any other form of disease. As is well known, they are commonly found at all periods of life upon the older cells of epithelium of the mouth, pharynx, and other parts, and they are present in immense numbers amongst the old cuticular epithelial cells in any disease in which these are softened by perspiration. They make their appearance in all internal parts of the body when any soft material begins to pass into decay. I have found them even between the laminæ of fibrin which had been deposited in an aneurismal sac. It is probable, therefore, that the germs of these vegetable organisms may even exist in the blood, and in the tissues in a state of health, but they are so exceedingly minute that they cannot be distinguished with certainty by the means of investigation at present at our disposal. Considering the general character of the morbid changes occurring in Cattle Plague, it is not surprising that low vegetable organisms should be found amongst the epithelium upon the surface of the mucous membranes of the nose, mouth, eyes, larger and smaller bronchi, biliary ducts, ureters, vagina, &c.; nor is it remarkable that they should exist in the blood itself shortly before death in severe cases of the disease Plate I., Fig. 11. There seems, however, to be little evidence in favour of the view that such organisms really constitute the *materies morbi*, *contagium*, or actual morbific agent.

It may be fairly asked if the increased nutrition of the germinal matter and its consequences above referred to, constitute the essence of the disease, and the germinal matter which is thus produced in such increased proportion establishes in a healthy animal morbid changes resembling those of the infected beast. This question cannot be fully discussed here, but must be deferred till some collateral matters have been disposed of. But it may be well to remark that the increase of the germinal matter is probably a consequence of a condition established by the action of the specific morbid poison, but the germinal matter now referred to is not the poison itself. Local and general inflammations, specific and non-specific, as well as fevers, contagious and non-contagious, slight and severe, are all accompanied by increase of the germinal matter, and I do not believe that this phenomenon in Cattle Plague has any more special relation to the cause of the disease, than the increased temperature. Just as in an acute inflammation resulting from an injury, for example, the increase of germinal matter is due to the altered state of things brought about by the injury, so, I believe, this phenomenon, as it occurs in Cattle Plague, is due to a state of things consequent upon and established by the *materies morbi*. In the *injury* the disturbance is local, and originates from without, but may lead to general internal changes. In the *disease* the disturbance influences the composition of the entire mass of the blood, and very soon gives rise to wide-spread local derangement, the particular seat of most intense action depending on a variety of circumstances which cannot be discussed in this place.

It will have been remarked that the changes which I have demonstrated in connexion with the germinal matter of the tissues generally, in *fevers*, precisely resemble those observed locally in *inflammations*. In fact, the local phenomena of inflammation precisely correspond up to a certain stage with the general phenomena of fever. The former may reach a degree to which the latter cannot attain, because, as it is scarcely necessary to observe, the death of the man or animal must occur long before *general* suppuration could be brought about.

It is remarkable that while this increase in the germinal matter is taking place, the temperature rises some degrees above the normal standard, and I think that the elevation of temperature in this disease, as well as in fevers and inflammations generally, can scarcely be due to increased oxidation, for both respiration and circulation are often seriously impeded, but attribute it rather to the phenomena occurring during the increase of the germinal matter and connected with this increase. If this be so, it is probable that an increase of germinal matter is *invariably* associated with the development of heat.

Professor Gamgee has proved that in Cattle Plague the temperature rises usually as much as five or six degrees.* This increase in the temperature is not dependent upon increased frequency of the pulse, and according to Professor Gamgee is one of the earliest and most constant and reliable signs of the disease; an opinion which receives support from what has recently been learnt from a careful study of the temperature in fevers affecting the human subject.

I desire now to direct attention to the highly important influences exerted by the masses of germinal matter in the capillary vessels, with the view of showing how their enlargement must cause serious derangement in the circulation and the nutrition of the tissues, and for the purpose of inquiring to what extent this change may enable us to account for some of the symptoms manifested during life.

In the first place it may be remarked, that even in health the germinal matter of the capillary walls projects somewhat into their interior in such a manner that the red corpuscles must one after another come into contact with it, especially when the stream of blood is small and the calibre of the capillary contracted. These red blood corpuscles may impart oxygen to the masses of germinal matter in the capillaries, and carry away carbonic acid; they would also tend to give or carry off heat, as the case might be, and thus would equalize the temperature of various parts. As has been before stated, in fevers and other conditions where the temperature of the body rises several degrees above the normal standard within a very short period of time, the masses of germinal matter are increased in size, while, on the other hand, the activity of the oxidising process, to which alone the development of heat is usually attributed, is greatly diminished. This is particularly observed in the formation of a common abscess, where, as has been distinctly proved by Simon, there is an increased local production of heat.†

It is, I think, probable that the alteration in the calibre of the capillary vessels several times alluded to, is due in the first instance to the influence exerted

* "The Cattle Plague," by John Gamgee, Principal of the Albert Veterinary College, &c., 1866.

† Article "Inflammation," Holmes' Surgery, vol. I, 42, note.

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by the enlarged nuclei connected with their walls, Plate III., Fig. 41. As these become enlarged from increased nutrition, they must form a serious impediment to the free passage of the blood.

From the above observations it appears that the Cattle Plague must be regarded as a fever, in which, in consequence of certain alterations taking place in the blood, the germinal matter of the vessels and of the tissues of the body generally becomes supplied with an increased proportion of nutritive pabulum. This is associated at first with increased development of heat, which probably still further favours the increased rate of growth of the germinal matter.

Until some days before the death of the animal the circulation through most of the minute vessels must have been carried on, but much more slowly than in the healthy state. The dilatation of the capillaries would necessarily permit the transudation through their walls of a greater quantity of nutrient material than under the normal conditions. The high specific gravity of the blood, the small quantity of solid matter contained in it, the draining away of albumen in the urine, and the free secretion from the surfaces of many mucous membranes, prove that soluble matters pass away from the blood. It is, I think, probable that the increased production of soluble materials in the blood of a nature unfavourable for elimination by the various excreting glands, is due to the imperfect oxidation. If these soluble matters were not soon appropriated by living germinal matters, they would soon pass into a state of decomposition. A minute examination of those tissues in which the congestion of the vessels is most remarkable shows that the germinal matter has absorbed a greater quantity of nutrient material than usual, as each mass is found to have increased considerably in size.

As the disease advances the circulation becomes more feeble, the blood stagnates in the capillaries, the temperature falls, respiration and oxidation become still further diminished, and death seems to be due, immediately, rather to the enfeebled circulation than to the distribution of poisoned blood to the nervous centres.

We have now to endeavour to ascertain how the changes in the blood leading to the increased formation of nutritive pabulum which permeates too readily the vascular walls is brought about, and this involves the consideration of the nature and mode of increase of the *contagium*, *materies morbi*, or special contagious material of Cattle Plague.

IV.—Of the Nature of the Morbid Poison—Contagium, of Cattle Plague.

Of the movements occurring in the mucus corpuscle, and of its multiplication.—On the changes occurring in ordinary living pus.—Pus is germinal matter, and may come from any form of germinal matter in the body.—Properties and powers of normal germinal matter, and of the pus descended from it.—Of the movements occurring in very minute particles of germinal matter.—Vaccine lymph.—No differences to be detected in the appearance of different kinds of living matter.—Of the passage of contagious matter into the blood.—Of the multiplication and reproduction of the contagious matter in the infected organism.—Concerning the possibility of the materies morbi passing into the substance of the normal living germinal matter.—Conclusion.

I now come to consider the probable nature of the actual *materies morbi* or *contagium* * of Cattle Plague, and in order to keep the discussion within reasonable limits I shall only permit myself to refer briefly to a few of the many collateral questions which bear more or less directly upon it, and shall, as far as possible, restrict myself to the consideration of new observations arrived at in the course of my own investigations.

There can be no doubt that the *materies morbi* or *contagium* is so light that it may be wafted long distances by currents of air. It is "*volatile*" in the sense of being "*light as air*," "swift as wind." But by the term "*volatile*" it is meant that the poison may be raised in vapour and condensed again as a solid, like camphor, or carbonate of ammonia, or as a fluid, like alcohol, ether, or chloroform, I respectfully submit that the *contagium* of Cattle Plague, does not possess this property. Important evidence has been obtained in favour of the view that it is living matter of some kind, and no living matter can assume the form of vapour.

Although there are undoubtedly many facts which might be urged in favour of the view that the *contagium* of this or other contagious diseases, really consists of germs of low animal or vegetable organisms which are capable of living parasitically for a time in the organisms of man and the higher animals, there are so many broad facts opposed to the general application of this doctrine, that I shall content myself by referring back to what has been said upon the subject in the first part of my report, page 132. Of course fever may be excited by the entrance of such living bodies into the circulation (or possibly by their death, as Dr. Laycock thinks), and derangements in the composition of the blood may result accordingly, just as fever and altered chemical composition of the blood may result from a general or local injury. But the question to be considered is not whether such changes *may* be brought about by animal or vegetable germs, but if all fevers and amongst them Cattle Plague, can be proved to be due to this cause.

We have such positive evidence, that, under certain circumstances in the organisms of man and animals "poisons" may originate, grow, and multiply, and then pass from the infected organism to others, and give rise in them to changes exactly resembling those in the organism from which they were derived, that I shall restrict myself as far as possible to the consideration of the probable mode of origin and multiplication of the subtle *contagium* or contagious poison.

Even in health living textures may be *transplanted* from one part of the body to another, and from one individual to another. Not only so, but there are textures in man which appear to be capable of living in connexion with the organism of some of the lower animals. In all these cases, however, the transference must be effected quickly, or the death of the living germinal matter of the detached tissue will occur before it is brought into relation with its new nutriment.

It is however otherwise with germinal matter which has been growing and increasing rapidly for some time. This may be removed and kept separate from the surface upon which it grew for a considerable time without losing its vitality. And it will readily grow upon surfaces prepared or not by previous changes for its reception in various parts of the same organism, or in connexion with corresponding surfaces or parts of different organisms.

We may consider, in the first place, the changes occurring in the germinal matter constituting a living mucus corpuscle, and the mode of origin and multiplication of pus. I have elsewhere advanced numerous facts which lead to the conclusion that mucus and pus corpuscles, like the matter of which the so called "nucleus" of all cells is composed, consist of living germinal matter, originally derived from the living germinal matter of normal textures which has been exposed to conditions favourable to its rapid increase.

We have sufficient evidence to show that living germinal matter allied to pus, developed under special conditions, possesses different properties, and gives rise to phenomena different from those produced by ordinary pus when transferred to other organisms. The facts known with regard to purulent ophthalmia, gonorrhœa and purulent infection, as it sometimes occurs in the wards of our hospitals, puerperal fever, and syphilis, are amply sufficient to prove this; and I imagine no one will doubt that in all these cases the actual poison which is transferred from one organism to another is derived not only from the infected organism, but, at least, in certain instances from the infected part which is the seat of the local change.

* This word "*contagium*" has been applied by Mr. Simon to the matter which is supposed to pass from one organism to another, and which possesses the contagious property, and, being short and expressive, I think it should be generally adopted.

Of the movements occurring in the mucus corpuscle, and of its mode of multiplication. — In papers already published I have discussed the nature of the movements occurring in various kinds of living matter, but it is necessary to allude in this place to those of mucus and pus. In the mucus corpuscle, easily obtained from the mucus of the throat, the moving power resides in a very transparent material, which has been called the "basis substance." This material or basis substance, although it appears when examined under ordinary magnifying powers perfectly clear, transparent, and structureless, is not, however, a fluid, or solution. It exhibits indications of being itself composed of very minute spherical particles which are free to move upon each other. These minute spherical particles of living matter can only be seen with the aid of a power of 3,000 diameters, and by dint of great care in the illumination, and even then not very positively. I believe that the motor power resides in these particles, and that it is a movement dependent not upon any ordinary force or chemical change, but to some peculiar power associated with *living* matter only, and I therefore call these movements *vital*.

Not only do protrusions occur at the circumference of a mass of living matter forming little projections, which have been termed, I think wrongly, "buds" and "excrescences," but these projections become detached. From the circumference of one mass many small portions may separate, or the whole mass may divide into two or more portions of equal size, or differing from each other in dimensions. The nature of the alterations of form occurring in a living mucus corpuscle will be understood by reference to Fig. 66 Plate V. It is in this simple manner that the mucus corpuscles increase and multiply, so that if a very few be freely supplied with nutrient pabulum, a vast number may result within a very short time. In some cases the so-called "nucleus" also divides, but in many instances the nucleus remains behind in the largest mass, while new nuclei make their appearance in the small particles. It is certain that the "nucleus" is not essential to the process, and that a "nucleus" may make its appearance as a new centre in a small portion of germinal matter *after* it has been detached from the parent mass. Nor are the minute particles so frequently found embedded in the substance of living germinal matter and figured in 10, 15, 66, 67, 71, 73, necessarily concerned either with the movements of the transparent "basis substance" or with its growth and subdivision. The phenomena occur when no such particles are present.*

On the Changes occurring in ordinary living Pus.— I propose now to bring forward evidence which seems to me conclusive as to the mode of growth and multiplication of pus corpuscles, and which, I think, goes far to show how living particles, so minute that they may be transferred considerable distances without loss of vitality, may be produced. I shall venture to employ the facts brought forward in this section in explanation of the phenomena observed in connexion with the more subtle materies morbi, or contagium of contagious fevers.

Pus is not formed by the *aggregation* of particles in the disintegrating tissues, as some suppose, but it really consists, as I showed in the first course of lectures I gave at the College of Physicians in 1861, of *living matter*. There is certainly no true cell-wall in the case of ordinary pus, and this is proved by the fact that protrusions of the matter of which pus corpuscles consists, may occur upon every part of the surface, and not only so, but some of these protruded portions, after moving a considerable distance away from the mass, become disconnected from it and thus new pus corpuscles are produced. It is in this way that the very rapid multiplication of pus corpuscles is effected. In pus from the bladder movements even more active than those in the mucus corpuscle are very easily observed, and when fresh in consequence of the alterations in form, not a single *spherical* corpuscle can be found. See Fig. 65, Plate V., representing some of the many different forms of pus corpuscles present in a very small quantity of pus. Every corpuscle exhibits a great number of these protrusions, and every protrusion might be detached and form a free pus corpuscle. I have known these movements continue in warm weather in pus corpuscles in urine containing little of the ordinary urinary constituents, for forty-eight hours or more after the urine had left the bladder. The very phenomena which take place upon the surface of the mucous membrane of the bladder may in fact be watched for hours under the microscope, and there are few things more beautiful or more instructive. When the corpuscles die, and their death occurs when they are acted upon by any fluid which is not adapted for their nutrition, the movements above described cease, and they invariably assume the spherical form.

Not only may active movements be observed in the masses of germinal matter above referred to, which have resulted from healthy germinal matter being supplied with a greater amount of nutrient pabulum than under normal circumstances, but they may be seen to occur in the white blood corpuscles, lymph and chyle corpuscles, as well as the connective tissue corpuscles, and the nuclei of various cells, and, there is reason to believe, with greater or less activity, in every kind of living germinal matter in nature. Such movements are not peculiar to the amœba, although from the circumstance that they were first observed in this creature, they have been termed *amœbiform*. Some writers appear to have considered that there was some special relation between all such moving masses of matter and amœbæ. The movements of the amœba, like the movements of pus, mucus, &c., are *vital* movements. The conditions required for the maintenance of life being more complex in the case of some forms of germinal matter than in others, we should conclude that such movements would only continue for a considerable period of time in particles after their removal from their natural habitat, in the lowest and most degraded forms, and this is actually the case. Some creatures are capable of supporting life under a great variety of conditions, although comparatively slight alterations would be fatal to others.

A mass of any soft living, germinal matter, when suspended in fluid in active movement invariably assumes the spherical form, and retains it for a short time after the movement has ceased, but if placed under favourable conditions it absorbs nutriment and soon exhibits *vital movements*, grows and multiplies. The amœba in water, the white blood corpuscles in the liquor sanguinis, are both spherical while the surrounding fluid is in active movement, but after they have been at rest for a short time they exhibit their characteristic and very wonderful movements.

Other changes may also occur in the pus corpuscle; supposing it to be subjected to influences unfavourable to this rapid growth, the material upon the surface may be precipitated, and thus a very thin layer of semi-transparent insoluble material may be formed, which is rightly termed '*cell-wall*.' Changes may then take place in the mass of the pus corpuscle itself; it may be resolved into oil-globules, and the many alterations which are familiar to observers may be readily noticed in pus corpuscles which are subjected to disintegrating processes or to the influence of fluids not adapted to their nutrition.

Pus is Germinal Matter, and may come from any form of Germinal Matter in the Body.—It seems

* It is probable that careful observations upon this transparent living moving material will teach us much concerning the nature of life. I think that the subject merits far more attention not only from physicists, chemists, and physiologists, but from philosophers, than it has hitherto received. I do not think that what will be learned from the study will favour the notions now most popular, but that is no reason why it should be any longer wholly neglected by those who profess to carry their inquiries to the utmost possible limits. Is it possible that some of those who profess to be most liberal in science are fearful lest inquiry should be pursued a little further than is favourable to their own particular view?

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probable that pus may be formed from the germinal or living matter of any tissue, not, as has been stated by Virchow and others, from epithelium and connective tissues only. Many kinds of pus have been described according to the different localities in which it has been found, and the different conditions under which it has been produced; but in all cases pus possesses certain general characters which show conclusively that it is living germinal matter. It is not possible to distinguish many pus corpuscles from lymph corpuscles, white blood corpuscles, and many other masses of germinal matter; indeed if the developing brain of an embryo be examined at an early period, it will be found that this important structure consists of nothing more than a number of spherical cells which could not, by any means we are yet acquainted with, be distinguished from many forms of pus corpuscles. If we carefully reflect upon many observed facts, we shall be compelled to admit that masses of germinal matter which resemble one another in every character we can ascertain, differ nevertheless remarkably in *power*, as is proved by the results of their living. Few recent writers seem to have fully recognized the remarkable truth that living things may agree in physical and chemical characters, but differ widely in power; that wide difference in vital power may be associated even with similarity of composition. It need scarcely be said that physical and chemical properties do not determine the *form* living matter is to assume.

Properties and Powers of Normal Germinal Matter, and of the Pus descended from it.—I will next venture to offer some remarks upon the properties or powers of germinal matter. Although much of what I shall say will necessarily be rather speculative, the interest of the matter seems to me so great that I cannot pass it entirely over. The germinal matter of tissue, being supplied with an increased quantity of pabulum, may give rise to pus, as I have stated, but pus differs in *power* from the germinal matter from which it was derived. It cannot, as far as we know, acquire the properties which the original germinal matter possessed. My meaning will be rendered clearer if I adduce an example. The germinal matter of cuticular epithelium may give rise to the peculiar hard material of which the so-called walls of the epithelial cell consist, and this same germinal matter of epithelium, if freely supplied with pabulum, may give rise to pus. It seems to me therefore that germinal matter may *lose* formative power, and become degraded, and cannot acquire it or regain it when lost. There is as it were no return to a high position for living matter which has once suffered degradation, nor can degraded germinal matter produce descendants with exalted power.

It must not, however, be supposed that degradation in formative power implies *diminished vitality*. It is a mistake to conclude, as some have done, that disease is necessarily associated with diminished vitality. If, in speaking of the various degrees of vitality, we refer to the rate of increase of germinal matter, we do have in most diseases *increased vital activity*. In inflammation, as compared with health, there is greatly increased vital activity; that is, more lifeless matter becomes *living* within a corresponding period of time.

It would seem as if the formative or developmental endowments of germinal matter were diminished or completely destroyed by its rapid multiplication, so that a mass of germinal matter, which in the course of a considerable time undergoing comparatively slow change, would give rise to descendants which might be concerned in the development of the highest and most complex tissues, if placed under conditions favourable to its too rapid growth would absorb much more nutrient matter in a given time, and produce descendants much more quickly. But although this rapid multiplication might continue, not one of the resulting masses would give rise to the formation of characteristic normal tissue. Too rapid increase is associated with degradation in power, and in man and the higher animals, and plants, if textures grow too quickly, the perfection of the tissues formed is marred and the period of their endurance is of necessity reduced.

Ordinary pus, then, may readily be produced if the nutrition of the germinal matter of a normal tissue be modified and increased. Under certain specific conditions which we are not yet acquainted with, pus, with peculiar and specific properties or powers, is formed, and this last exhibits a far greater vital activity and is less easily destroyed than the first.

The various facts and arguments advanced in this report render it, I think, probable that the materies morbi or contagium of contagious diseases, like pus, is generated in the organism under certain special conditions. Like pus, I think it has originally descended from the germinal matter of the organism. So virulent is the poison, and such is its power of living under varying conditions, that having once sprung into existence, it is almost impossible to extirpate it. If, however, it were possible to destroy all the existing particles of any specific form of contagious germinal matter, it is reasonable to conclude that no new living matter with the same peculiar properties or powers would be reproduced, unless the very same complex conditions which were present at its origin recurred.

Of the Movements occurring in very minute Particles of living Germinal Matter.—Although there is no difficulty in demonstrating the vital movements in a mucus corpuscle, white blood corpuscle, or pus corpuscle, and thus establishing the *vital state* of these bodies, it is otherwise in the case of excessively minute particles of the $\frac{1}{50000}$th of an inch in diameter or less. And we know that if the contagium exist in the form of living particles, these must be less than this and yet capable of retaining their active and peculiar properties.

Still, as the existence of movement in small particles or their actual division and sub-division, will alone prove that they are of the same nature as the pus corpucle and other forms of living matter forming masses of considerable size, it is desirable to record the facts I have been able to demonstrate, though they may not be very positive or strongly in favour of the view which upon the whole seems to me most worthy of acceptance.

I have seen most distinct movements in exceedingly minute particles of living pus as represented in Plate V., Fig. 74, and I have no doubt whatever that the particles I saw had been detached from an ordinary pus corpuscle, although I did not witness their actual separation.

I have been exceedingly careful to avoid mistaking the very slow rotation (rolling over and over) which commonly affects such minute particles suspended in fluid, for an actual change of form. And I confess in many instances I have been unable to satisfy myself if the apparent alteration in outline observed in a minute particle under very high magnifying powers, was due to its presenting in succession different surfaces to the eye, or to a veritable alteration in its form. In the particles of pus which I have figured, I am, however, quite certain that the change in form was of the nature I have described. I believe I have seen similar alterations in the particles in vaccine lymph, but from the perpetual vibration of these I cannot at present feel perfectly confident.

That such particles as those figured are sufficiently light to be carried by currents of air is sufficiently proved by the fact that the scales of the wings of lepidopterous and other insects, and starch corpuscles, each of which weighs more than a hundred times as much, are supported by the currents of air in our ordinary rooms, deposited upon shelves, and even carried for long distances. A careful examination of the particles suspended in the air, as seen in a sunbeam, renders all further observations upon this point superfluous.

It appears, therefore, that the most minute particles detached from a living pus-corpuscle exhibit movements resembling those observed in the entire corpuscle, but actual proof that such minute par-

ticles would, under favourable circumstances, increase in size and become undoubted pus corpuscles is wanting. It is quite possible that certain conditions would be favourable to the division and subdivision of these very minute particles, and unfavourable to their increase to the ordinary dimensions of the pus corpuscle, and that somewhat different conditions would determine their increase in size, the process of division and subdivision still continuing, but occurring much more slowly.

I have been able to watch the movements of some extremely minute amœbæ which multiplied freely without first reaching the size of the ordinary individuals.

In Fig. 71, Plate V., I have represented the appearance, under a magnifying power of 5,000 diameters, of some of the most minute amœbæ I have been able to discover. Several of these were less than the $\frac{1}{10000}$ of an inch in diameter, and yet were in a state of most active movement. The alteration in form was very rapid, and the different tints in different parts of the moving mass resulting from alterations in thickness were most distinctly observed. These bodies might, in fact, be described as consisting of minute portions of very transparent material, exhibiting the most active movements in every direction, in every part, and capable of absorbing nutrient materials from the surrounding medium. A portion which was at one moment at the lowest point of the mass would pass in an instant to the highest portion. In these movements, one part seemed as it were to pass through other parts, while the whole mass moved now in one, now in another direction. Movements in different parts of the mass occurred in directions different to that in which the whole was moving.

Many of the lower and simpler forms of life, as is well known, grow and multiply as imperfect forms, and attain, under altered conditions, a higher and altered state of existence, during which the process of multiplication is more limited. So, it appears possible that the exceedingly minute living particles which, I imagine, constitute the "contagium" of contagious diseases, may be the degraded offspring of germinal matter which originally possessed comparatively exalted formative powers.

Vaccine Lymph.—If a little vaccine lymph be examined under very high magnifying powers a multitude of very minute particles are observed and these exhibit the most active molecular movements. These particles have often been termed débris and have been regarded as quite unimportant elements of the lymph. To them, however, I believe the active properties of the lymph are entirely and solely due. And I should be no more inclined, in the absence of the most conclusive evidence, to regard the fluid portion of the vaccine lymph as the active material than I should be to assume that the fluid in which the spermatozoa were suspended was the fertilizing agent and that the spermatozoa themselves were merely epithelial débris and quite unimportant, or that the fluid in which the yeast fungi or bacteria were growing, was the active agent in exciting fermentation, while the actually growing, moving, and multiplying particles were perfectly passive. The germinal particles in all cases are without doubt the active agents, and it seems to me as much opposed to the facts of the case to maintain that the *materies morbi* of Cattle Plague and other contagious fevers is a material that can be dissolved in fluid and precipated and reformed, as it would be to regard any living organism as a result of the concentration of an albuminous solution and capable of resolution and precipitation.

The little particles represented in Plate V., Fig. 69, could not be distinguished from the minute particles of pus or other forms of living germinal matter, and I think they consist of a peculiar kind of living matter, the smallest particle of which, when supplied with its proper pabulum, will grow and multiply, giving rise to millions of little particles like itself each having similar properties and powers.

I consider it as almost certain that the material of which these particles are composed has the power of forming matter like itself from pabulum around it, which differs from it in properties and composition. They may pass from the organism on which they grew to another, and will grow and multiply there if they meet with the proper pabulum. The only condition in which matter is known to exhibit these powers of self-multiplication is the living state.

The circumstance that vaccine lymph retains its activity if kept in a tube for several weeks seems conclusive as to the possibility of the particles retaining their vitality for a considerable time after they have been removed from the surface upon which they grew,—the arguments advanced as proving that the active power resides in the particles and not in the fluid, being admitted. It is no more difficult to explain the fact that such living particles may be dried without losing their power than that an amœba or rotifer should exhibit the same peculiarity. As this property is observed in connexion with many of the lower forms of life, we might almost anticipate that the living matter from the highest organisms, if reduced to a degraded condition, would retain its vitality under circumstances which would certainly cause its death in the normal state. Since it has been rendered almost certain that the active powers of vaccine lymph reside in the minute particles of living germinal matter, and it has been proved that these may be dried (imperfectly) without loss of power, it is surely not too much to conclude that the materies morbi of other and allied contagious diseases is probably composed of living particles which have the same property of living for some time in a state of partial desiccation.

No Differences to be detected in the Appearance of different Kinds of living Matter.—I have shown that even with the aid of the highest powers of the microscope, no differences can be discerned between germinal matter from the cell or elementary part of the highest organism at any age or period of development, and germinal matter of which the lowest, simplest being in existence is composed. A minute particle of the germinal matter of an amœba could not be distinguished from a portion of a pus or mucus corpuscle, or white blood corpuscle, &c.; compare Figs. 67, 69, 71, 74.

It will probably strike many as very remarkable, that the highest magnifying powers hitherto placed at our disposal, serve but to convince us that a minute particle of the germinal matter of the most malignant tumour, or the most rapidly growing pus-corpuscle, resembles in every particular that can be ascertained, a minute particle of healthy, living, germinal matter from the blood or from any tissue, and it is proved beyond a doubt by the same means of inquiry, that the living particles of germinal matter in vaccine lymph cannot be distinguished from those present in normal lymph or chyle.

In short, that no differences exist in colour, form, density, chemical composition, or movements, between living particles having the most diverse properties and giving rise to the production of the most different substances (formed material). I think we shall find ourselved compelled by the necessities of the case to refer the production of these different substances to what must be termed *a difference in power*, to which we may attribute the different relations of the elements, which must be brought about immediately before their combination to form the different compounds occurs.

Of the passage of the contagious matter into the blood.—I apprehend that it will be generally conceded that living contagious poisons capable of reproduction produce their peculiar influence upon the organism through the blood,—in fact that they pass into this fluid, grow and multiply there, give rise to changes in its composition, and indirectly affect the action of different organs and tissues of the body. It has been but too frequently proved that if, in certain states of the blood, particles of living matter allied to pus be

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introduced, they give rise to changes which often very rapidly destroy life. And it is probable that by the formation, multiplication, and death of certain living particles, an altered state of blood unfavourable to the nutrition of other and higher forms of living matter is engendered.

In some instances it is probable that the living germinal matter makes its way in the first instance into the lymphatic vessels, grows and multiplies there, giving rise to abscess in the glands; the blood in some cases being also affected, in others escaping altogether.

It is at least doubtful if the growth and multiplication of every kind of these living particles will take place in perfectly healthy blood, if they be introduced. Numerous facts which will occur to every practitioner render it far more probable that, at least in the case of the great majority of contagious fevers,—a certain state of blood must exist before the contagious poison can grow and multiply in its peculiar way, although we have not yet discovered in what particulars this state of blood differs from the healthy state. At any rate it is a condition not associated with a large number of red blood corpuscles, or with a highly active state of the oxidising processes—in short, with a well-developed organism and a vigorous constitution; nor is it brought about by living in the open air, a proper supply of wholesome food and water, and careful attention to various matters which practical experience and physiology have shown to be efficacious in keeping the organism in health.* To enter fully into this part of the question would, however, be out of place in this report.

Admitting, then, that the active poisonous matter of contagious diseases generally consists of living matter, and that this living matter enters the blood, let us inquire how the living particles may pass into the vascular system where there is no inoculation, no solution of continuity, as far as can be ascertained, in the vascular walls. We may explain the fact, that of a number of persons equally exposed to the influence of a contagious poison, some will contract the disease while others will escape, by supposing that in the latter case the living particles are prevented from passing through the vascular walls, or, coming into contact with the blood, that they do not grow and multiply, but become destroyed, and the substances resulting from their destruction excreted, and at once removed from the body.

How, then, do the living particles pass through the vascular walls and enter the blood; and what are the circumstances that would favour or interfere with their passage? Thin-walled capillary vessels, as is well known, come very near to the surface in many parts of the body. Those of parts of the mucous membrane of the nose, mouth, and conjunctiva, even in a state of perfect health, are covered with a very thin layer of protective epithelium, while those of the air cells of the lung are practically speaking bare. In many morbid states the epithelial covering of the mucous membranes enumerated above is very soft, and sometimes is reduced to a thin layer of a soft pulpy mucus, in which any foreign particles would very readily become embedded. It is reasonable to suppose that the contagious germs would find in this soft mucus a nidus favourable for their reception, and at the same time soluble materials adapted for their nutrition. They would grow and multiply, and probably minute off-sets from them would soon find their way to the external surface of the capillary walls.

I have shown that there is strong reason for concluding that when the capillaries are much stretched, as when fully distended with blood, as in the early stages of inflammation, particles of living matter, probably derived from the white blood corpuscles, make their way through the walls with some of the serum, and grow and multiply in their new position external to the vessels.* An "exudation," therefore, does not consist of mere fluid, but contains particles of living growing matter, which pass with the fluid through the capillary walls from the blood. These particles become the spherical granular cells which are often seen external to the vessels in inflammation. Each absorbs nutriment, and just as in the case of all other kinds of living matter grows, and divides, and subdivides. This view concerning the origin of many of the corpuscles in exudation is supported by the fact that in pneumonia, and in some other conditions in which the capillary distension is very great, blood corpuscles, which are much larger than the particles of living matter just referred to, pass through the capillary walls without the vessels being torn across. And every one who has made very minute injections is familiar with the fact that minute longitudinal rents or fissures may be made quite wide enough for a red blood corpuscle to pass through edgeways without destruction of the vascular tube. It is, therefore, certain that particles of minute size may pass through capillary walls without the occurrence of actual rupture.

Now the state of things referred to above—a soft, moist state of the mucous surfaces, a dilated condition of the capillaries, combined with a weak, flaccid state of their walls, which would follow long-continued congestion, and which is intimately connected with a weak heart's action and feeble condition of the nervous system,—are those which would facilitate the passage of such living germs as I am supposing, and is it not probable that these are the very conditions which exist in the organism about to be the victim of a contagious fever? In such cases the composition of the blood is altered, and its fluid constituents manifest a tendency to permeate the vascular walls more readily than in a perfectly healthy state. This state of blood would doubtless affect the nervous centres presiding over the contraction of the arterial walls and regulating the flow of blood through them, thereby influencing the nutrition of the part, and in this way a relaxed state of the arterial walls and a congested state of capillary vessels might be induced, or, already existing, might be increased. It is this low and but too often ill-defined weak state of health that we should endeavour to detect by most careful observation, and at once treat. Nay, it seems to me almost certain that every serious contagious and non-contagious acute disease dangerous to life to which we are subject is preceded by a condition of system which in many particulars is a departure from health. If this can be altered, the liability to the supervention of the acute attack no longer exists. It is in the direction of anticipating the occurrence of actual serious, well-marked disease that those most earnest in advancing medicine may reasonably hope to do useful work. And it seems certain, that the more minutely we investigate, the more likely shall we be to learn how to discover and to appreciate that slight departure from the healthy state which precedes, and often by some considerable time, the development of many of the most serious and most fatal maladies.

Of the Multiplication and Reproduction of the Contagious Material in the infected organism.—From the observations already advanced concerning the size of the smallest active particles capable of growing and multiplying, it will be inferred that the quantity of material capable of giving rise to a contagious disease is wonderfully small, and that within the organism this minute portion of matter multiplies a million-fold. One or more particles having entered the blood would of course circulate with that fluid. It is possible that the particles would multiply to some extent while actually circulating; but it is probable

* Experience and observation seem to indicate that more may be done in the way of enabling persons to resist the influence of contagious living poisons than by destroying the poisons themselves. Our experience of the Cattle Plague may appear to be against this view, since robust, healthy animals are attacked and destroyed, but I am by no means convinced that we are yet able to distinguish with certainty a thoroughly healthy, vigorous animal or man. It is quite certain that different men and beasts exhibit the greatest differences with regard to the power of resisting the invasion of disease.

* On the Germinal Matter of the Blood, with Remarks on the Formation of Fibrin.—Trans. Mic. Soc., Dec. 1863.

that many of them would fail to traverse the capillary vessels, being obstructed by the masses of germinal matter which project into their interior and in which, or in the white blood corpuscles, they might even become embedded. The conditions to which they are exposed in the capillary vessels would be more favourable to their rapid multiplication than those present in the circulating blood, and they would therefore grow and increase considerably in this situation.

We have now to inquire more precisely into the circumstances under which the wonderful increase of the poison is brought about. There are two views essentially different from one another, which may be supported by different arguments. 1. It might be maintained that the contagious material actually passing into certain portions of the living germinal matter of the organism might excite in these new actions, and cause them to divide and sub-divide very actively, and communicate to them the same properties which the original particle possessed, somewhat in the manner in which the wonderful powers existing in connexion with the germinal matter of the spermatozoon are communicated to that of the ovum and affect to some extent every one of the multitudes of masses resulting from its division.

2. The contagious particle or particles having gained access to the fluids of the uninfected organism may absorb nutrient matter, grow and multiply, giving rise to a progeny exactly like themselves in every particular.

In the first case the actual living matter of a healthy organism is caused to take upon itself a new and peculiar action in consequence of the influence of another kind of germinal matter upon it. In the second the contagious material simply grows and multiplies at the expense of the pabulum.

It is open to discussion which of these two views is supported by the greatest number and most pregnant facts. I incline strongly to accept the latter as the more probable of the two.

It may, however, be fairly asked, if, when a pus corpuscle from the surface of the conjunctiva of a person suffering from purulent ophthalmia, or when a particle of gonorrhœal pus comes into contact with an uninfected conjunctiva and grows and multiplies, establishing a similar morbid condition to that in operation upon the surface where it grew, the multitudes of resulting pus corpuscles are the direct descendants of the pus corpuscle or are derived from the germinal matter of the cells of the conjunctiva which are modified in consequence of its action upon them ?

It seems to me probable that the corpuscles capable of exciting a new action upon an unaffected surface are the direct descendants from the original corpuscles which excited that action. Not only so, but I believe they take the nutrient material which was destined for the nutrition of the normal cells, and live at their expense. Just as in the case of cancer, the adventitious rapidly growing germinal matter takes the nutriment destined for the normal tissue, and even feeds upon the latter in consequence of its powers of growth being much more active.

It is most probable, I think, that in the case of the specific pus corpuscles growing upon a mucous surface the germinal matter of the normal cells may increase and multiply too. Indeed, in some instances I am sure that this is the case. So that there are two distinct processes going on; 1, the multiplication of the specific corpuscles, and 2, the multiplication of the germinal matter of the normal cells modified in consequence of the altered circumstances to which they are exposed. And it therefore follows that not every one of the pus-like bodies formed is capable of exciting the specific action, but the specific bodies outstrip in the rate of their multiplication, to so great an extent, the masses resulting from the normal germinal matter, that the number of descendants of the latter would be comparatively insignificant and would soon be completely overwhelmed by the former.

Upon the whole, then, I venture to think that the millions of contagious particles produced in the organism in an eminently contagious disease, are all the direct descendants of the very few, or perhaps even single particle first introduced; just as the millions of bacteria and fungi developed in certain decomposing organic matters in the course of a few hours may have been produced from one or at most a very few particles. And that although in the secretions upon the mucous surfaces, and in internal parts, there may be many masses of germinal matter resulting from the increased access of pabulum already many times referred to, these latter do not form the active elements of the contagious material or contagium.

Concerning the possibility of the particles of contagium passing into the substance of normal living germinal matter.—It is true that in the substance of many masses of germinal matter found in the secretions and discharges of animals dying from Cattle Plague, and of many other diseases, some minute particles which would ordinarily be termed granules, which refract the light very highly, and probably have been often mistaken for minute oil globules, may be invariably observed in great number. The nature of these particles is not known. They are however met with in almost all kinds of living matter with which I am acquainted, and different kinds are observed. In Fig. 71 at *a.* some are seen in a very minute amœba. In Fig. 15 some are seen in masses of germinal matter from the milk. It seems to me probable that some of these particles have originated in the germinal matter itself, while others have passed into it from without.

Now it is certain that such particles are very numerous, and are commonly found in masses of germinal matter so situated as to render their entrance from without, not only possible, but probable. The fact of the amœba opening itself as it were, and then enclosing upon foreign particles, and embedding them in its very substance, is well known. Nor is this a phenomenon peculiar to the amœba, but it is possessed by other kinds of germinal matter. And now that the supposed importance and even the actual existence in many cases of the cell-wall have been disproved, and the active, spontaneous movements which used to be called amœbiform, because it was supposed they were peculiar to the amœba, have been proved to be common to living matter in general, it is probable that this and other properties, equally characteristic of all kinds of matter in a living state, will be admitted.

It must then be regarded as at least possible that particles of contagious living matter less than the $\frac{1}{100000}$ of an inch in diameter might pass into the substance of a white blood, lymph, or chyle corpuscle, and thus embedded, the particle might be carried to all parts of the system. The matter itself might increase and multiply in the corpuscle, destroying it and living at its expense until the new collection attained a size larger than that of the corpuscle. Or, the foreign living particles in the white blood corpuscle might interfere with its division and sub-division, and the germinal matter of the corpuscle itself, attain a size larger than ordinary. Or the presence of the bodies supposed might cause the death of some of the particles of germinal matter and the formation of oil globules and other substances which might go on accumulating until the white corpuscle became too large to traverse the smaller capillaries. The phenomena above referred to, would not only seriously interfere with the growth and nutrition of the white blood corpuscles, but would prevent the material undergoing conversion into red blood corpuscles. And in consequence of the diminution in number of the red blood corpuscles, and the reduction of the total quantity of blood in the system, various secondary phenomena would follow.

But in whatever way the minute particles of germinal matter supposed to be included in the white blood corpuscle might cause their enlargement or interfere with their function, impediment to the free circulation of the blood in the capillaries must be induced. The minute particles now stationary would rapidly increase and multiply, and some might make their way through the vascular walls towards the surface or into the surrounding textures.

The minute particles embedded in the germinal matter sometimes so closely resemble minute vegetable germs that in some cases it is difficult to believe they are not of this nature, and have gained access from without. In other cases these particles are of the nature of nucleoli, and have originated in the germinal matter itself, while I am quite certain that some of the minute highly refracting particles embedded in the white blood corpuscles, pus corpuscles, and some other masses of germinal matter, result from changes occurring in the germinal matter itself, and are closely allied to fibrin.* I am, however, not able without further investigation to pursue this part of the inquiry.

Without, therefore, pretending to be able to identify the actual *materies morbi* of the Cattle Plague, or to distinguish it positively from the other forms of germinal matter present in the fluids, on the different free surfaces, and in the tissues in such vast numbers, I think the facts and arguments advanced in this paper tend to prove ; first, that it is germinal matter ; secondly, that the particles are not directly descended from any form of germinal matter of the organism of the infected animal, but that they have resulted from the multiplication of particles introduced from without ; thirdly, that it is capable of growing and multiplying in the blood ; fourthly, that the particles are so minute that they readily pass through the walls of the capillaries, and multiply freely in the interstices between the tissue elements or epithelial cells ; and lastly, that these particles are capable of living under many different conditions —that they live and grow at the expense of various tissue elements, and retain their vitality, although the germinal matter of the normal textures after growing and multiplying to a great extent has ceased to exist.

The reader will naturally ask which of all the particles seen in the secretions from the nose and eyes, intestines, vagina, &c., are the particles of *contagium*, for it has been proved that in all these the contagious property resides. He will probably have gathered from the statements made that I regard some of the most minute particles present to be alone the active agents, while the epithelial particles themselves, the fungi and bacteria, are probably as passive as the oil globules or crystals of triple phosphate commonly met with. Particles which I believe to be contagious are represented in Figs. 21, 25, 26, 33, 35, 36, 67, and the granular matter amongst the bundles of fibrous tissue, represented in Figs. 18 and 19, I think consists entirely of particles, the smallest of which would induce the Cattle Plague, if introduced into the blood of an uninfected animal. Figs. 7, 8, 33, 35, 36, represent particles of the supposed "*contagium*" or active contagious matter in the vessels. It would, I think, be quite possible to devise experiments which would determine positively which is the real contagious matter. The real contagious material has passed unnoticed and has really formed part of what has been called debris and granular matter. By the carmine fluid we can however distinguish particles of germinal matter from fat granules, myelin particles, and other debris. Nor are observations and experiments upon this most interesting question concerning the nature of contagium limited to Cattle Plague. Although this disease affords in very many ways advantages for study far greater than many other contagious maladies, and deserves on many grounds the most thorough and extended scientific investigation, it is probable that many of the questions of the greatest general interest may be successfully worked out by studying other contagious maladies affecting man or animals.

Of the particles of Contagium.—It has been proved experimentally that from the breath of the diseased animal and from the air in the neighbourhood, matter can be obtained which possesses contagious properties. I have endeavoured to ascertain if such particles as I suppose to constitute the *contagium* could be actually demonstrated by microscopical investigation with the aid of the highest powers. Mr. Crookes has for some time past been investigating this part of the subject, and has obtained some very interesting and important experimental results. He has had the kindness to give me a tube in which a piece of wool had been placed and exposed to the breath of a diseased animal and fully impregnated with contagious matter, and another tube through which the breath of an animal dying from the disease had been passed. I moistened the wool and the tube with perfectly pure glycerine and subjected this to examination with the $\frac{1}{20}$th.

Although in each case I have seen particles resembling those already many times referred to in my report, I cannot attach much importance to these two isolated observations, or look upon them as trustworthy, for in the first place the number of minute particles of various kinds present makes it difficult to identify with any confidence the supposed particles of *contagium* ; secondly, as there are undoubted sporules of fungi, I could not prove that the very minute particles which I should be inclined to regard as the contagium had not been developed from these ; thirdly, it is desirable never to place much reliance upon only one or two observations of this character.

At the same time it is only right to state that the piece of wool in one of the tubes through which the air had been first filtered exhibited a much greater number of minute particles, resembling those which I regard as particles of contagium, than were obtained from the second piece of wool at the other end of the same tube by which the air was subjected to a second filtration. I do think, however, it might be *possible* to determine the question from this experimental side. The microscopical part of the investigation presents so many practical difficulties that I should not like to enter upon it without performing in the first instance a great many preliminary experiments, so as to ascertain by experience the most convenient and delicate methods of examination.

In conclusion, I will attempt to account for the phenomena which succeed one another, in what I believe to be the order of their occurrence in a case of Cattle Plague, from the time when the contagious poison enters the body to the death of the animal.

With regard to the nature of the contagium itself evidence has been adduced to show that it consists of very minute particles of matter in a living state, each capable of growing and multiplying rapidly when placed under favourable conditions ; that the rate of growth and multiplication of these minute particles far exceeds that at which the normal germinal matter of the blood and tissues multiplies, and that they appropriate the pabulum of the tissues, and even grow at their expense.

Let me suppose that some of the living particles of contagium derived from an infected animal, so light that they may have been wafted long distances by currents of air, but yet capable of effectually resisting the influence of the external conditions to which they may have been exposed in their transit, reach an uninfected animal. Coming into contact with the soft and moist mucous surfaces, and finding a nidus suitable for their lodgment, and pabulum fit for their nutrition, they grow and multiply.

It is at least doubtful if such living particles could take the further course about to be described, if the organism were in a perfectly healthy state. But in the present state of our physiological knowledge of man and domestic animals it is difficult or impossible to distinguish the state in which there is a susceptibility or predisposition to take a contagious malady, from conditions of system which, not necessarily characterised by robust health, are nevertheless, consistent with work, activity, and longevity. In fact we do not possess, at the present time, sufficiently exact data to enable us to appraise with anything approaching to correctness and certainty the value of individual life.

In an animal about to be infected with Cattle Plague it appears probable that, the minute living particles

* See my paper "On the Germinal Matter of the Blood ; with emarks on the Formation of Fibrin." Trans. Mic. Soc. Dec. 1863.

having reached the surface of the mucous membrane, perhaps already rendered suitable for their nutrition by previous morbid changes, gradually multiply amongst the soft epithelial particles until some of those produced reach the walls of the capillaries almost immediately beneath. It is possible that some of them may be drawn down the windpipe during inspiration, or even into the air cells of the lung. In the latter case they would gain a very ready access to the surface of the capillary wall.

We may suppose that at the time the particles come into contact with the vascular wall the capillaries happen to be distended, and consequently their walls so thin as to permit small particles to pass through them. Such a state would obviously favour the entrance of minute particles into the blood. One can conceive them gradually extending like particles of an amœba, and slowly insinuating themselves through the capillary wall, or they might become embedded in the germinal matter of the capillaries, and in this way gain access to the blood. Having reached the interior of the vascular system, they would circulate with the blood, and for a time would give rise to no symptoms whatever; but in consequence of possessing highly active powers of growth they would grow and multiply, increasing at a greater rate in proportion as their numbers increased. They would soon derange the normal changes going on in the blood; many would probably soon become adherent to the wall as they traversed the more minute capillary vessels, and growing and multiplying in this situation would seriously impede the circulation of the blood, partly perhaps acting mechanically, partly by deranging the nutritive changes occurring in the vessels and in the tissues external to them. Derangement of nervous action would soon follow, and upon sensitive surfaces impaired or perverted sensation, and in the voluntary muscules feeble and irregular contractions would result, while the movements of the involuntary muscular fibre which give rise to rumination would cease to be excited, and various phenomena consequent upon the cessation of this important process would follow. Perhaps rigors, partly the result of direct, partly of reflex, action, might occur about this time.

The heart's action increasing in frequency during the early period of the disease would perhaps slightly retard the tendency to the capillary stagnation; but the causes which led to the original congestion continuing, the impediment would gradually increase, and the capillaries would become more dilated. Increased exudation, and here and there hæmorrhage, would occur; the germinal matter of the capillary vessels and small veins, and that of the tissues external to these absorbing the transuded fluid would increase considerably in amount, and it is probable that this change is intimately connected with the increased development of heat, which almost constantly occurs at this stage of the disease.

The circulation now becoming weaker, while the accumulation in the capillary vessels still continued, complete stagnation of the blood in certain of the capillaries would occur, and the number of foci would gradually increase. The blood in the vessels first affected would lose its colouring matter, while its white corpuscles and the living particles of contagious material would increase and multiply. Perhaps from being surcharged with materials requiring excretion, or perhaps in consequence of these not being in a proper state for elimination, the blood does not flow freely through the vessels of the various excreting organs, liver, lungs, and kidneys, and the action of other secreting glands soon ceases from the same circumstance.

As the capillary congestion extended from the point at which it commenced as from a centre, and as the centres of congestion themselves in the various tissues increased in number, alterations in the chemical composition of the mass of the blood still circulating in the system must result, and this would still further add to the mischief.

After the blood has remained stagnant in the vessels for a short time, it undergoes change in colour, and the dark red appearance at first seen passes through various shades until a dusky greenish hue familiar to all who have observed the post mortem appearances results.

In a severe case the patches of capillary congestion increase in number from day to day, and are much more numerous in some parts of the body than in others. In this disease the mucous membrane of the alimentary canal seems to be specially affected, and in many cases the changes resulting from the stagnation of the blood lead to complete disorganization of the tissue. There is no inflammation, but death of a portion of the tissue may occur from complete cessation of the circulation in the vessels which supply it. In the majority of cases, however, the animal dies before the morbid changes have reached this degree; but it is common enough to find a shrinking and wasting of a portion of the mucous membrane corresponding to the congested vessels, as, for example, in the fourth stomach. In the small intestine the effects of the stagnation of blood in the capillaries are often complete destruction of a number of the villi, a morbid change which would alone cause the death of the animal.

The congested state, however, is not confined to the mucous membranes of the gums, mouth, air tubes, and almost the whole tract of the alimentary canal. It affects also the capillaries of the skin, inducing first a red rash, commonly distinct upon the almost naked skin of the udder, but by no means *limited* to this part of the body, and in many cases leading to morbid changes in the cutis and cuticle constituting the *eruption*.

In consequence probably of the alteration effected in the mass of the blood by the occurrence of the local congestions, and partly perhaps from the congestion in the capillaries of the mucous membrane of the bronchial tubes and the lungs themselves, partly in consequence of impaired muscular and nervous action, the process of respiration becomes seriously interfered with. A remarkably emphysematous condition of lung, which in some cases extends to the areolar tissue of the body, results.

It need scarcely be said that many of these changes act and react upon one another. The heart's action gradually becoming more and more feeble, fails to propel the now seriously altered blood, even through those capillaries which still remain pervious, the temperature falls several degrees, and the action of the great nervous centres becomes more and more feeble and at length ceases.

Perhaps the extreme degree of congestion resulting from changes induced by the enormous multiplication and accumulation of the minute particles of contagium in many capillaries of the skin and mucous membranes may be an indication of a tendency to its elimination from these points; and it seems not improbable that if a sufficient proportion of the blood could be kept circulating in the majority of the capillary vessels, while at the same time, time was allowed for the elimination of the poison from these surfaces, and especially if the free action of the excreting organs could be encouraged, by which the materials in the blood resulting from the action of the Contagium in that fluid would be at once eliminated, the life of the animal might be much prolonged or saved. But when stagnation of the blood has actually occurred in a great number of spots in different parts of the body, more especially if in consequence of this and the contact of irritating materials resulting from decomposition of the food, disorganization of the villi has actually taken place, recovery would seem to be impossible. And even if the recovery of an animal after a severe attack of fever could be brought about by great care, practically this would be useless, because the expense of a long convalescence and the nourishment requisite to restore him to his previous weight would exceed the value of the beast.

The particles of contagium, which have greatly multiplied in the stagnant fluid within the capillaries, readily make their way through the capillary walls, probably with a small quantity of serum, and become

Dr. Beale. Report to Commissioners.

mingled with the cells, &c., which are being detached from the surface; while in the case of the cuticle, where these cells form a firm investment, the particles of contagium multiply and cause portions to be detached in flakes. From every part of the alimentary canal as well as from the skin and probably from the glands connected with those surfaces, the pouring out of the living particles of contagium proceeds, and continues till death occurs. These retain their vitality for a long time after death, and it appears probable that they are not at once destroyed, even when the decomposition of the surrounding organic matters has commenced.

In the fourth section of my report, I have made use of many facts obtained in the course of other inquiries, and the observations on the pus corpuscle and the movements of living matter were advanced in the lectures I delivered at the Royal College of Physicians, in 1861 and 1865.

If any apology were needed for the introduction of speculative notions in this report upon the Cattle Plague, I would venture to remark that I found it impossible to prosecute my inquiries and discuss the various questions which presented themselves for solution without resorting to hypothesis, and I think that one method by which we are likely to succeed in gaining real information upon the essential nature and mode of propagation of contagious diseases, as well as upon other complex physiological and pathological questions, is by testing the validity of various hypotheses which obtrude themselves upon the mind of the observer, one after another, as the inquiry slowly proceeds step by step.

I have to regret that my report contains some repetition, and that I have been precluded from condensing it into a much smaller space. These great faults would have been corrected had I been able to devote more time to its preparation.

LIONEL S. BEALE.

FIG. 1.

Capillaries and small vein distended with blood corpuscles. Cattle Plague. × 130.

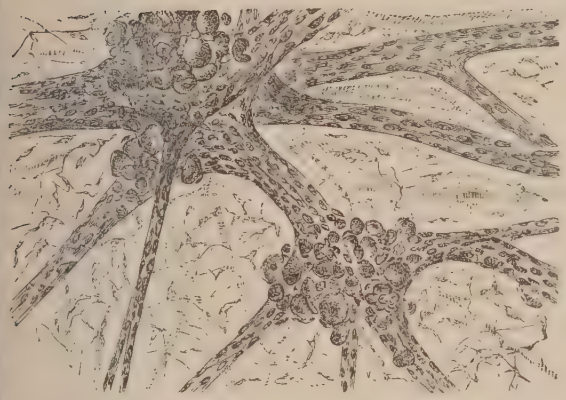
FIG. 2.

Small vein from same situation as the artery represented in Fig. 3. The masses of germinal matter of the vessel are much enlarged, and the connective tissue-corpuscles outside the vessel are much increased in size and are undergoing division. × 700.

FIG. 3.

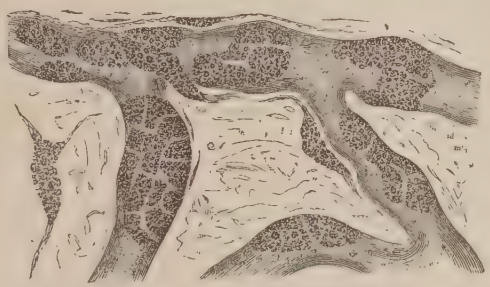
Small artery from connective tissue beneath depression of mucous membrane of fourth stomach. Cattle Plague. *a*, Small cells with numerous oil globules; *b*, a large mass of germinal matter obstructing capillary. × 700.

FIG. 5.



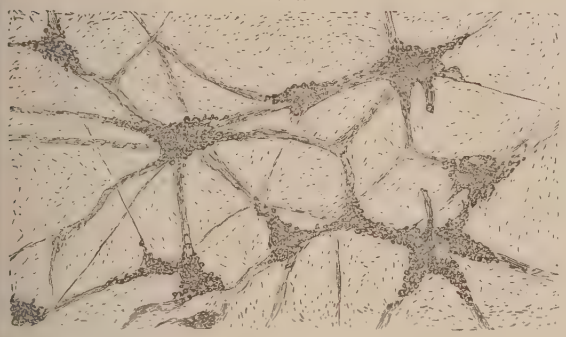
Portions of two ganglia with connecting nerve trunks. Same specimen as in Fig. 6, but more highly magnified. × 215.

FIG. 4.



Capillary from same situation as the artery and vein represented in Figs. 2 and 3. The masses of germinal matter of the capillary are very much enlarged, and are dividing and subdividing to form new masses. × 700.

FIG. 6.

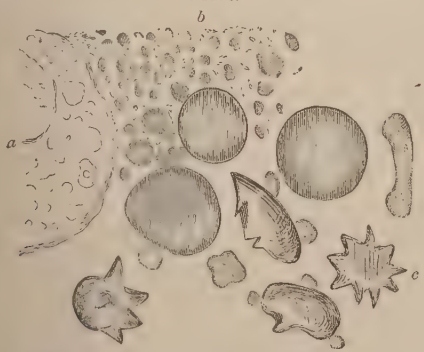


Ganglia and connecting bundles of nerve fibres in the connective tissue beneath mucous membrane. Small intestine, young bull. × 29.

FIG. 7.

Capillary loop from Malpighian body of kidney. Cattle Plague. Containing numerous white blood corpuscles and many minute particles of germinal matter (contagium?). × 700.

FIG. 8.

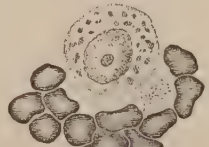


Blood pressed from intestinal capillaries into a small mesenteric vein. Cattle Plague. The serum was reddish. *a*, Part of white blood corpuscle in outline; *b*, minute particles of germinal matter in immense number in all parts of the field. The smooth round bodies are young red corpuscles. The angular corpuscles, *c*, are old and altered red blood corpuscles. × $\frac{1}{10}$.

FIG. 9.

Very small masses of germinal matter, interior of small vein as in Fig. 2. × $\frac{1}{10}$.

FIG. 10.



White and red blood corpuscles from a branch of the pulmonary vein. A quantity of delicate granular (germinal) matter is seen around the lower part of the white corpuscle. × 1,800

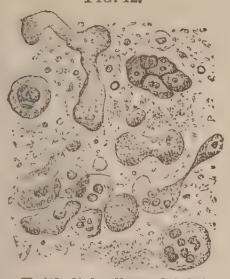
FIG. 11.

From central part of a dark red clot taken from aorta—Cattle Plague—within 24 hours after death. *a*, Largest red blood corpuscles and those of average size; some were stellate; *b*, vegetable organisms, bacteria? *c*, white blood corpuscles, exhibiting active movements. × 700.

$\frac{1}{1000}$ of an inch.		× 29 = 2 inch object glass.
$\frac{1}{1000}$	,,	× 130 = $\frac{1}{2}$ inch do.
,,	,,	× 215 = $\frac{1}{4}$ inch do.
,,	,,	× 700 = $\frac{1}{12}$ inch do.
,,	,,	× 2,800 = $\frac{1}{50}$ inch object glass.

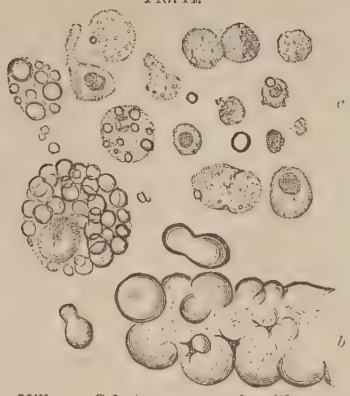
REFORM CLUB
PALL MALL

FIG. 12.



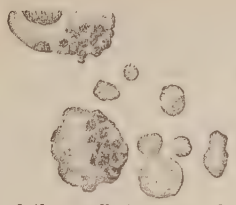
Epithelial cells multiplying in mucus of vagina. Large growing masses, like that represented in the upper part of the figure, very numerous. × 215.

FIG. 14.



Milk. *a*, Colostrum corpuscle with germinal matterand oil globules; *b*, oily matter forming cylindrical masses; *c*, growing germinal matter, the so-called puslike corpuscles of the milk. × 700.

FIG. 15.

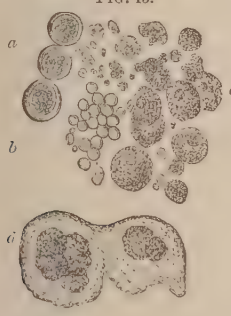


Some of the smallest masses of germinal matter in milk. × 2,800.

FIG. 16.

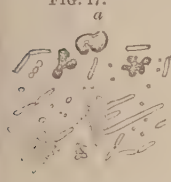
Vertical section through the centre of a well-marked papule (pustule?) from the udder of a cow, sent by Mr. Ceely, January 14th 1866, upon which the eruption and roseoloid rash were well marked. There were also numerous scabs; *a* is the central softened portion of the papule. Natural size.

FIG. 13.



Mucus from vagina, growing and multiplying rapidly. *a*, Sporules of fungi; *b*, small sporules of fungi; *c*, corpuscles and puslike cells. The manner in which the rapid multiplication of imperfectly formed epithelial cells takes place is represented at *d*. Observe the concentric layers of the imperfectly hardened formed material. × 700.

FIG. 17.



Vegetable growths in the mucus of the gall bladder, which were very numerous. Below *a*, a myelin corpuscle. ×1,800.

FIG. 18.

Fibrous tissue of the corium or true skin from the softened part of the papule, *a*, Fig. 16. The intervals between the fibres are occupied with germinal matter, "contagium," growing and multiplying rapidly. × 215.

FIG. 19.

A portion of Fig. 18. magnified 700. The masses of germinal matter (contagium?) can be seen dividing and subdividing into new portions which are growing rapidly and invading the bundles of white fibrous tissue. *See* also Fig. 25.

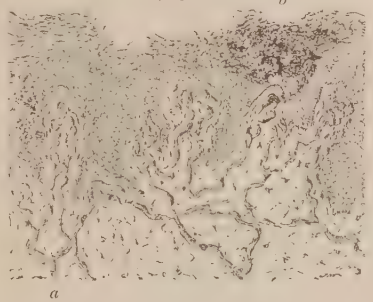
FIG. 20.

Outline drawing, showing how the germinal matter may pass from the capillaries and reach that part of the cuticle where the cells are arranged parallel, *a*, whence it grows horizontally in various directions, and strips off the superficial layers of the cuticle.

FIG. 21.

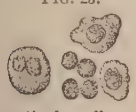
One of the loops of vessels in a papilla of the mamma beneath the eruption. × 730.

FIG. 22.



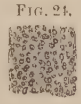
Section through cuticle and cutis in the seat of the eruption, showing at *a* a papilla, the cuticle over which is still in a healthy state, while that above the papillæ at *b* is undergoing disintegration caused by the growth and multiplication of germinal matter among the cuticular cells, as shown by the dark patches. × 130.

FIG. 23.



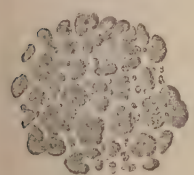
Young cuticular cells and masses of germinal matter growing and multiplying under scab. 700.

FIG. 24.



Minute sporules of fungi amongst the superficial cuticular cells: eruption. × 1,800.

FIG. 25.



Minute particles of germinal matter (contagium?) from the fibrous tissue of the skin, beneath the eruption (Fig. 19). × 1,800.

FIG. 26.

Cuticular cells under scab. Eruption on mamma, showing how the cells are invaded by the growth and multiplication of the minute particles of germinal matter (contagium?). × 700.

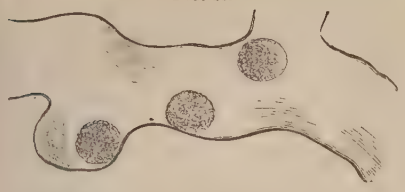
FIG. 27.

Papillæ from beneath the eruption. The cuticle is much more easily detached from the cutis than in health. × 130.

$\frac{1}{100}$ of an inch. |—| × 215
" " |—————| × 700.
" " |—————————| × 1,800 = $\frac{1}{2}$ inch object glass.
" " |—————————————| × 2,800.

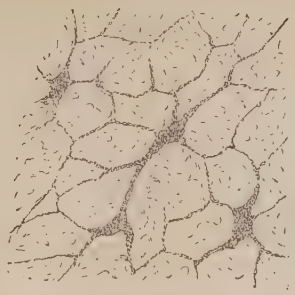
REFORM CLUB
PALL MALL

FIG. 28.



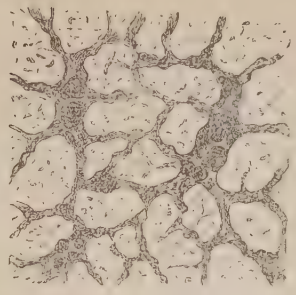
Capillary of lung showing diverticula. Three white blood corpuscles are seen in the interior. × 700.

FIG. 29.



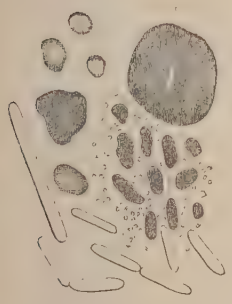
Connective tissue corpuscles. Surface of healthy mucous membrane over epiglottis just beneath the epithelium. × 700.

FIG. 30.



Enlarged connective tissue corpuscles. Surface of mucous membrane over epiglottis—Cattle Plague—just beneath epithelium. × 700.

FIG. 31.



Masses of germinal matter and vegetable organisms (bacteria?) in active movement, from surface of villus. × 2,800.

FIG. 32.

Surface of mucous membrane of fourth stomach, corresponding to a thin depressed circular spot like an ulcer: *a*, superficial capillary vessels varying very much in diameter, filled with granular matter and minute particles of germinal matter. The orifices of several gastric glands are seen in the spaces bounded by the vessels, and the deeper vessels also delineated on a lower plane. × 350.

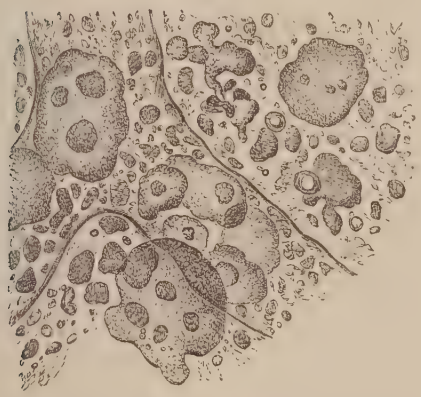
FIG. 33.

A small portion of one of the smallest vessels represented in Fig. 32, showing particles of germinal matter coloured deep red by carmine. × 2,800.

FIG. 34.

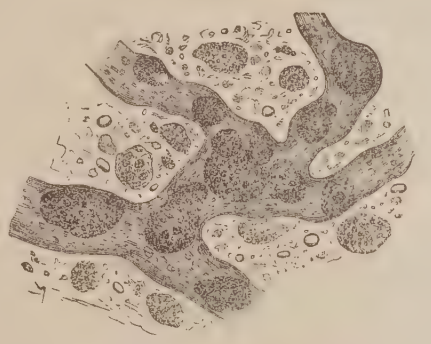
Portion of one of the larger vessels on the surface of the mucous membrane represented in Fig. 32, containing masses of germinal matter. × 1,800.

FIG. 35.



Portion of a capillary from the surface of a villus. Small intestine: from a very bad case of Cattle Plague. The vessels were covered with large and small masses of germinal matter, and contained masses of the same characters in their interior. × 2,800.

FIG. 36.

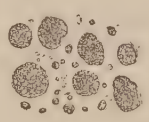


Capillary vessels from the surface of a villus containing large masses of germinal matter. × 700.

FIG. 37.

Very small cells with myelin particles in external portion: from air-cells of the lung. × 1,800.

FIG. 39.



Masses of germinal matter from the external surface of a villus. × 700.

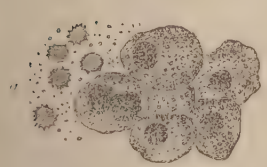
FIG. 41.

Capillary. Retina of calf, showing enlarged nuclei in the walls projecting into the interior of the vessel. × 700.

FIG. 42.

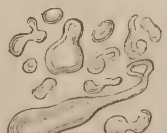
Portion of muscle showing the enlargement and multiplication of the nuclei in the contractile material. This is a very common appearance in the muscles of animals dead of the Cattle Plague. × 700.

FIG. 38.



From the air-cells of the lung. Such cells were very numerous. *a*, Blood corpuscles and granules. × 700.

FIG. 40.



Myelin particles from the external portion of cells in air-cells of the lung. × 2,800.

$\frac{1}{1000}$ of an inch. × 130.
" " × 215.
" " × 700.
" " × 1,800.
" " × 2,800.

REFORM
PALL MALL

FIG. 43. FIG. 44. FIG. 45.

FIG. 46.

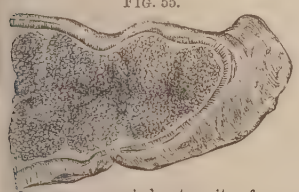
a

Worm-like bodies of different sizes. From the muscles of the system. Cattle Plague, × 25. The largest, Fig. 43, *a*, is about the $\frac{1}{16}$; the smallest, Fig. 46, less than the $\frac{1}{100}$ of an inch in length.

FIG. 47. FIG. 48.

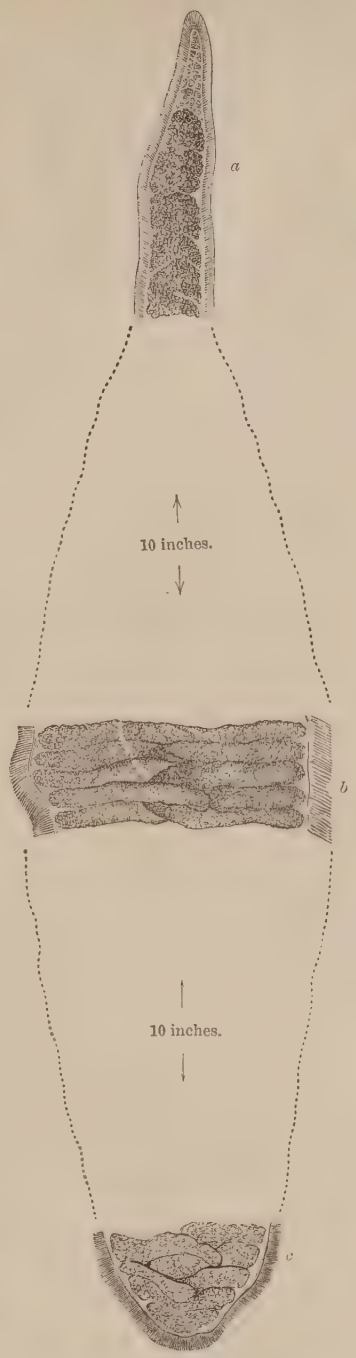
Worm-like bodies from elementary muscular fibres from the voluntary muscles. Cattle Plague, × 25. Fig. 48 is more highly magnified in Fig. 49, the portions marked *a*, *b*, *c*, being alone represented.

FIG. 55.



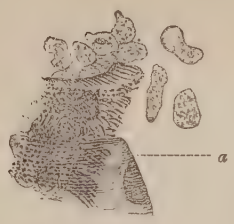
Lower or rounded extremity of one of the worm-like bodies, showing how closely it is surrounded by the sarcous tissue of the muscle. × 215.

FIG. 49.



The upper, middle, and lowest portions of the same worm-like body as that represented in Fig. 48, but magnified 215 diameters. The division of the contents into collections, apparently the result of segmentation of the mass at an earlier period, was very distinct.

FIG. 50.



Portion of one of the worm-like bodies, ruptured, showing structure of wall and escape of little bodies from its interior. *a*, Muscular tissue, in which it is embedded. × 700.

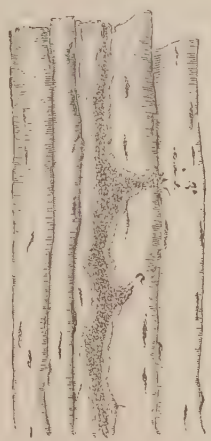
FIG. 51.

Cilia-like processes, covering whole surface of envelope of worm-like body. × 700.

FIG. 52.

Cilia-like processes, covering the whole surface of the external investment of the worm-like body. × 1,000.

FIG. 53.

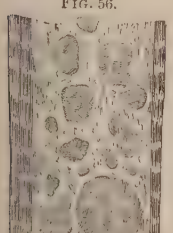


Worm-like body from elementary muscular fibre. Trapezius: showing escape of its contents through lateral pores or fissures. × 130.

FIG. 54.

Portion of upper extremity of one of the worm-like bodies, embedded in muscular fibre, showing the fissure, *a*, by which it gained access to the interior of the fibre at an early period of its development. *b*, muscle nuclei. × 215.

FIG. 56.



a

Tubular space in the central part of an elementary muscular fibre, extending from one extremity of a young worm-like body, showing an early stage of development of the bodies found within the envelope. × 2,800. I regard the particles marked *a* as a young stage of the bodies represented in Fig. 62 at *b*.

FIG. 57.

Very young worm-like body, from a muscular fibre of the heart of a cow. Cattle Plague. × 700. *a*, Muscle nucleus.

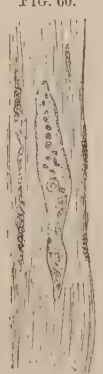
FIG. 58.

Very young worm-like body undergoing development in an elementary muscular fibre. Heart of cow. Cattle Plague. × 700.

FIG. 59.

Portion of young worm-like body embedded in elementary muscular fibre, which has been broken transversely. × 215.

FIG. 60.



Very young worm-like body in elementary muscular fibre of the leg. × 215.

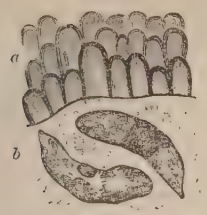
FIG. 61.

Portion of worm-like body in an elementary muscular fibre from the trapezius. The envelope contained very few of the little bodies in its interior. × 215.

$\frac{1}{100}$ of an inch. |——| × 29.
$\frac{1}{1000}$ » |—| × 130.
» » |——| × 215.
» » |————| × 700.
» » |——| × 2,800.

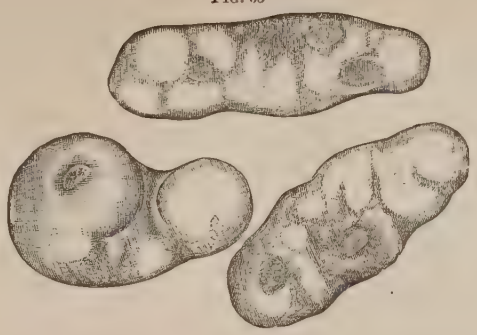
REFORM CLUB
PALL MALL

FIG. 62.



a. Portion of membrane with hair-like processes distended with fluid and subjected to strong pressure.
b. Two of the small bodies in their fully developed state from the interior of a very long worm-like cyst. × 1,800.

FIG. 63

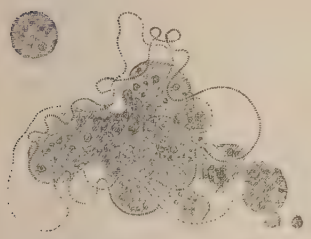


Individual bodies from the interior of the worm-like sac. × 2,800.

FIG. 64.

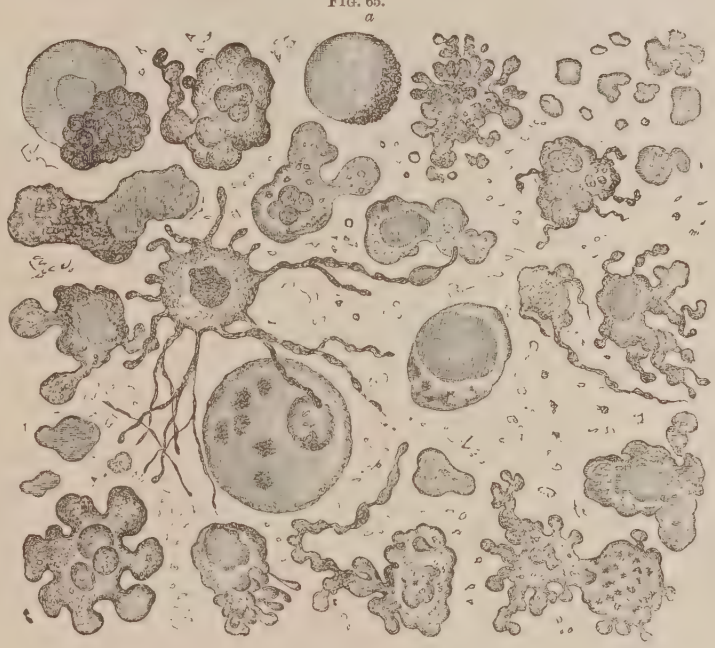
Bodies from interior of sac after soaking in digestive fluid at 100° for 2½ hours. × 700.

FIG. 66.



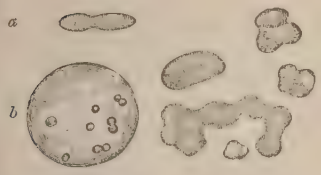
Mucus-corpuscle. From the mucus of the throat of man in health. Showing the different forms assumed by the living mass within a minute. × 2,800.

FIG. 65.



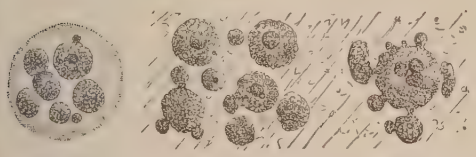
Pus corpuscles, exhibiting very active movements, from a case of chronic inflammation of the bladder. Man. Showing alterations in form due to (vital?) movements. × 1,300.

FIG. 67.



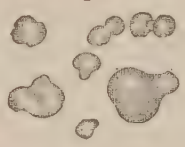
Particles from the vaginal mucus of a cow. Cattle Plague. *a*, Bacterium amongst these. *b*, A mass of germinal matter containing minute particles like fungi. These are seen in the white blood and pus corpuscles, &c. × 2,800.

FIG. 68.



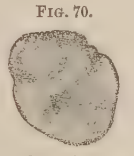
Diagramatic figure, showing formation of pus corpuscles in an epithelial cell, and multiplication of corpuscles when set free.

Fig. 69.



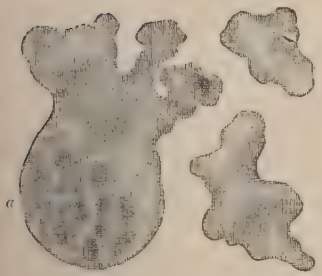
Particles from vaccine lymph, exhibiting very active movements. × 5,000.

FIG. 70.



Free nucleus from a salivary corpuscle. Man. Showing changes taking place in refraction of different parts of the mass. Slow movements were observed while the shaded portions altered in position. × 2,800.

FIG. 71.



Very minute amœbæ from water containing a little dead animal matter. The smallest free particles exhibiting very active movements were less than the $\frac{1}{10000}$ of an inch in diameter. × 5,000.

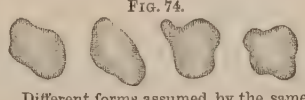
FIG. 72.

Portion of a living pus corpuscle from the bladder. The portion marked *b* moved out in four seconds, was then retracted, and the other portion was extended in about the same time. *a*, Bacteria. × 2,800.

FIG. 73.

A portion of a pus corpuscle from the bladder of man, the third day after the urine containing it had been passed. The vital movements had long ceased, and it was very transparent like the one figured in Fig. 65. at *a*. Little particles were oscillating in all directions. One of these was seen to take the course indicated by the dotted line *a* in the fraction of a second. × 2,800.

FIG. 74.



Different forms assumed by the same minute mass of germinal matter of pus from the bladder, during five seconds. × 2,800.

$\frac{1}{10000}$ of an inch. × 700.
" " × 1,800.
" " × 2,800.

PALL MALL

REFORM CLUB PALL MALL

On Disinfection and Disinfectants.

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

R. ANGUS SMITH, Ph. D., F.R.S., &c.

PART I.

When I was requested by the Royal Cattle Plague Commission to undertake experiments on disinfection, no directions were given me, and no advice, further than the remark made by Dr. Lyon Playfair, that it would be well to make the report as practical as possible. I quite concurred in the propriety of this suggestion; but people have very different ideas concerning the meaning of the word practical. Chemists generally look on all experimental work as practical, but men in business may consider it to mean that which has been proved to be valuable, or otherwise, by very large operations; and some extend its use to such results as can be performed only by a very large portion of the community. Practical in this sense none of the experiments can be, and, as many substances have been tried, it was impossible to operate on such a scale as a farmer may be supposed to require for his own use except in a few cases. The experiments are therefore, like all others, intended to regulate our practice, and to direct the formation of principles.

The word infection has from early times been used in relation to disease only, although it means also the power by which one body acts in its own peculiar method on another, and more properly the action itself. An old writer, Mr. Place, in a book called "A Hypothetical Notion of the Plague," says,—

"The manner of the pestilential matters' operation is called 'contagion,' or 'infection,' and, by a metonomy, putting the cause for the effect, we usually call the matter itself so, as having the virtue of contagious operation in it."

He continues,—

"Infectious or contagious virtue and operation, then, is an assimilating quality and conversive force in the matter to change the nature of things by turning them into its own. When by immediate contact one body alters the properties and changes the natural inward form and constitution and disposition of another, and works it to conformity to itself, draws it into its own likeness, impressing its own character upon it, and communicating to it its own form and figure,—matter that has this virtue of operation is called infective or contagious, and the matter that is violently drawn and forced by it out of its form is said to be infected."

This is remarkably similar to the expressions used by Liebig, in his work on "Agricultural Chemistry,"* where he says :—

"But if it is true, as we have just shown it to be, that mechanical motion is sufficient to cause a change of condition in many bodies, it cannot be doubted that a body in the act of combination or decomposition is capable of imparting the same condition of motion or activity in which its atoms are to certain other bodies; or, in other words, to enable other bodies with which it is in contact to enter into combinations or suffer decompositions." We see here the maturer mind of the modern man of science.

To a chemist, then, infection is the process by which a chemical action is transferred through one body to another, whether by the agency of organic bodies or otherwise. When a putrid substance, comes in contact with a sound substance, and communicates putrefaction to the latter, it is a process of infection somewhat similar to the communication of disease by the contiguity of a diseased to a healthy person. The communication may be supposed to be made by chemical compounds, organic, but not organized.

A physiologist and microscopist is inclined to give organized form to the agents of his mind, and nature seems to be inclined to suit this class of men as well as the chemist, and for this reason we are led into the great discussion on the cause of fermentation and putrefaction, ending in the late inquiries into the probability of spontaneous generation. I certainly fancied that I was giving good service by proving the presence of organic and oxidizable matter in the air by the use of permanganate of potash, but the results obtained by M. Pasteur regarding the existence of organized substances, as we may call them, or germs, is a step so definite, clear, and important, that we must at once begin as on a new foundation, and date theories of many diseases and also of disinfection and cure from this era. I do not mean to say that the idea was utterly unknown to the world. I may quote Bishop Berkeley as saying the truth in wider terms than those used, as far as I know, by Pasteur, but he must stand in relation to the Frenchman as Mr. Place did to Baron Liebig, clear-sighted, thoughtful, ever great, but unable to reach the great aim of scientific inquiry, the experimentum crucis.

The words in Siris are (par. 140) :

"Nothing ferments, vegetates, or putrefies without air, which operates with all the virtues of the bodies included in it, that is, of all nature. * * * The air, therefore, is an active mass of numberless different principles, the general sources of corruption and generation; on the one hand, dividing, abrading, and carrying off the particles of bodies, that is, corrupting or dissolving them; on the other, producing new ones into being, destroying and bestowing forms without intermission."

And in paragraph 141 he says :—

"The seeds of things seem to be latent in the air, ready to pair, and produce their kind whenever they light on a proper matrix. The extremely small seeds of ferns, mosses, mushrooms, and some other plants are concealed and wafted about in the air, every part whereof seems replete with seeds of one kind or other. The whole atmosphere seems alive. There is everywhere acid to corrode, and seed to engender. Iron will rust and mould will grow in all places."

The tendency of inquiry in modern times has been to establish a very ancient belief, that decomposing substances, animal and vegetable, produce disease, and are ultimately connected with infection and contagion. This result may be said to be the summary of all that has been done by the General Board of Health and Sanitary Commissioners of late years. It is true that some persons object to these conclusions, and there are even many who have attempted to prove that the gases from decomposing substances were beneficial to health. The fancies or superstitions of the population have somewhat assisted this latter retrograde idea, and we find some delighting in putrid canals and rivers, others admir-

* Page 229, first Edition, Playfair's Translation.

ing the gases from brick-kilns, and others, again, those from accumulations of farmyard manure. The pressure of experience, however, is so strong that these ideas will probably soon vanish. It has often been asked—Will a sewer produce cholera, or plague, or cattle disease? We cannot say so, or that every kind of disease may be produced from such accumulations of organic matter. The great epidemics that have passed over Europe seem always to have come from some extraneous source, to act as if planted by some seed, and not to have risen up spontaneously here. Without attempting to examine this matter carefully, the result would seem to be, that whilst the decomposition of organized beings after death produces gases and vapours that are opposed to health, these gases or vapours are incapable of originating, although they may be capable of feeding, some of those diseases, such as cholera or plague, which have been observed at all times to come from a warmer climate. There must, however, be some first origin of these diseases, and we cannot prove that the first origin might not take place in our climate, although it seems probable that it requires a warmer sun and a richer vegetation than is to be found in the north. This, however, is sufficiently made out—that, when these diseases do come amongst us, they take root with most effect in those places where decomposing matter is found. If we were to suppose a seed of disease planted in a rich, fertile soil of decomposing matter, we should give a pretty fair description of the fostering effect of impurity on disease. It would in fact appear as if the putrid matter itself took the disease, and transferred it to the living. There seems to be nothing entirely opposed to this view of the case. The question, however, is and has always been—What is the nature of that substance which may be said to form the seed or germ of the disease? Chemists have been inclined to consider it a substance in process of decay, as the quotation from Liebig already given shows. Physiologists and microscopists have been more inclined to consider it as an organised substance. When Gay Lussac passed a bubble of air into the juice of grapes, and found that fermentation began at once, it was believed that the oxygen was the prime mover, and that, when once begun, the action did not cease. When, however, Dusch and Schroeder found that flesh did not decompose if the air was previously passed through a good filter of cotton wool, some difficulty was thrown on the subject. It would appear as if oxygen were not the only agent in the atmosphere causing decomposition. The investigations of M. Pasteur, who found the subject in this uncertain condition, have advanced it so far that we may now with certainty reason in the belief that organized substances are really found in great abundance in the atmosphere, and that they are the cause of some hitherto entirely mysterious phenomena, putrefaction included. His object was first to inquire into the possibility of spontaneous generation, and he found that carefully filtered air allowed no organisms to appear in vegetable solutions. He found that near the usual surface of the ground these organisms were so numerous that whenever a vessel containing vegetable matter fit for their growth was opened for a very short time they were found to enter, that in cellars and damp and quiet places, where there was no air or dust floating about, these organisms were fewer, and that, as he ascended the sides of the Alps and the Jura, they diminished in number. A commission of the French Academy confirmed his results. If we examine previous inquiries into the compounds resulting from the decomposition of organic substances, we shall find nothing which is at all calculated to bring out such an intelligible rational view of the origin of many diseases, and also of some phases of putrefaction. Chemists, when they have examined products of the latter action have found sulphuretted hydrogen, carburetted hydrogen, hydrogen, carbonic acid, nitrogen, hydrogen, ammonia, acetic acid, lactic acid, butyric acid, and numerous uncertain bodies having no activity, and utterly incapable of producing those prodigious results that are found when that force begins to work which produces plague, smallpox, or black death.

Sulphuretted hydrogen, itself one of the most deadly of gases, has not been known to produce instantly any disease. It cannot in fact be said in any way to be similar to an infection. It may lower the tone of health, and it does so, and it may gradually diminish vitality to such an extent that disease ensues; or, if it is in very great quantity, it may kill as suddenly as a cannon shot; but it never can for a moment be compared with the infectious matter of smallpox or of scarlet fever. Chemists much in a laboratory are exposed to it daily; sometimes in considerable quantities, and the result has been as stated. The same may be said more or less of all substances found by chemists as the result of putrefying matter. It is not here asserted that these gases are not unwholesome, for their unwholesomeness is more or less, beginning with sulphuretted hydrogen, which is already said to be so deadly; but it is extremely important to distinguish them from those hitherto and still mysterious substances which convey infection. The question is quite open. Is the cause of disease an organic substance in the process of decomposition conveying that decomposition to another body, or is it an organised germ? Suppose we take the first view of the case, we may review the products of decomposition obtained from blood, as that fluid has a pretty uniform composition, taken from the same animals, and it is more easily examined.

The two great theories may be called Liebig's and Pasteur's; the first, Liebig's, dealing with organic decomposing matter ready to communicate its action by its own activity. That this idea has a sound scientific basis will to a great extent be admitted. I am disposed to think it quite undeniable at present. The second, that of Pasteur's, leads to organized bodies or germs, and although he also has not first originated the idea, the clearest proof and expression is due to him. He does seem to have retained firm hold of a part of the battle ground gained from chemistry. There is probably a point where the organic and organized touch so nearly as to be difficult to distinguish; but here the distinction between the two is very real, and the point of contact is still to be sought.

In speaking of the opinions of these two distinguished men, I may say that I intend to use these ideas, as stated, without attempting to make them responsible for more. I fear I shall not be able for a while to read fully the entire papers of M. Pasteur, as the latest have not arrived at our library here; but once given the proof of the existence of germs, the possible results are endless, and I speak with the full belief that both the theories are true, and that some infections may be wandering about organized, or at least as germs, and others as chemical compounds, with or without definite forms or powers of producing them.

I am afraid of moving out of the sphere of the chemist, and hope I do not go too far when I suppose a class of diseases caused, 1st, by gases, not putrid but injurious, easily diffused into the air, and more or less soluble in water; 2nd, by vapours, heavy and capable of falling, especially in cold air, capable also of being taken up in the moisture of fogs; 3rd, by putrid or decomposing substances and ferments; and 4th, by organized bodies in various stages and ferments. Disinfection is the destruction of one or all.

The composition of gases arising from putrid matter does not seem to be uniform, but to depend on several conditions, one of which is the supply of oxygen. Dalton found the marsh gas from the floating island at Derwentwater to contain

Carbonic acid	6
Pure marsh gas	47
Nitrogen	47
	100

No trace of oxygen appeared in it.

Bunsen found the gas from a pond in the Marburg Botanic Gardens to contain, after he had removed the carbonic acid,—

Marsh gas	48·5
Nitrogen	51·5

Had Dalton removed the carbonic acid he would have had 50 nitrogen and 50 carbonic acid. The two analyses closely approach.

In Staffordshire Howard obtained—

Pure marsh gas	99·6
Carbonic acid	0·3
Nitrogen	0·1
	100·0*

Dr. Letheby made many analyses of gases from decomposing sewage, and found in his report on sewers and sewage gases from 13 to 84 per cent. of marsh gas, and above 3 per cent. of sulphuretted hydrogen in some places.

From the Marburg Botanic Garden the difference in winter and summer is given. (Jahresb., vol. 4, p. 849, table.)

	In summer.	In winter.
Marsh gas	76·61	47·37
Carbonic acid	5·36	3·10
Nitrogen	18·03	49·39
Oxygen	—	0·17

Analyses of gas from coal pits varies also excessively. Bischof gives the following table :—

	Bischof.			Th. Graham.	
	1.	2.	3.	4.	5.
Marsh gas	83·08	91·36	79·10	94·2	82·5
Olefiant gas	1·98	6·32	16·11	—	—
Oxygen gas	—	—	—	1·3	1·0
Nitrogen	14·94	2·32	4·79	4·5	16·5

The specimens here given of gases from marshes or ponds may be supposed to have been formed in a similar way.

The gases which I obtained from putrefying blood were as follow :—

Carbonic acid	97·09
Sulphuretted hydrogen	1·93
Hydrogen	0·1804
Carbonic oxide	0·1396
Carburetted hydrogen	0·0729
Nitrogen	2·5171

The unabsorbed gases of themselves are—

Carbonic oxide	4·8
Marsh gas	2·5
Hydrogen	6·2
Nitrogen	86·5

The amount of these last gases was so small that I am quite willing to suppose some errors in one or two.

The analysis of the gas arising from the sewage matter at the bottom of the Medlock is—

Nitrogen	5·35
Carbonic acid	5·84
Marsh gas	88·81

The matter here was extremely putrid, and the water over it putrid also, and therefore free, or nearly so, of oxygen. It is curious that in this case the amount of nitrogen is so small, resembling more the mixture from some of the coal beds. In cases where the water is extremely clear above the turf, at the roots of which the marsh gas forms, as, for example, at the floating island of Derwentwater, the nitrogen is much greater.

These analyses show that the nitrogen diminishes when there is an excess of putrid matter, and increases with an excess of purer water than the mass which is decomposing. The blood was putrefied as free from air as possible. There are two modes of explaining the difference in the amount of marsh gas : 1st, there being less air admitted, the amount of nitrogen was necessarily less if this gas was obtained from the air ; but if obtained so, how did the air enter ? it must have penetrated into spots from which it had no power of returning without great mechanical efforts ; it must have been by an act of diffusion, the oxygen being continually taken up and the nitrogen left alone ; but can we imagine this to take place in the coal beds, even if we do imagine it at the bottom of a pond ; 2d, the nitrogen must come from the organic compounds. In this case, we may suppose or not a supply of oxygen. If we suppose no continuous supply of oxygen, we have the carbonic acid formed by the carbon seizing the oxygen of the organic matter, and this no doubt it does in the case of the blood. The amount of carbonic acid which can be formed in this way is easily found. There is, however, the oxygen of the water, and in the case of the blood gas there are no hydrogen compounds to correspond ; blood decomposes at a high temperature independently of the external air.

[If it were allowed to decompose slowly with a supply of oxygen such as it might obtain by diffusive action through porous substances, the decomposition would be attended probably with more nitrogen, just as the marsh gas from rather clear pools has more nitrogen. The oxygen in this way becomes a means of breaking up the nitrogen compounds. If there is little oxygen the nitrogen goes to make ammonia.

There is, however, another explanation. When there is little putrid matter, the action is not so rapid, so that perhaps this will give rise to a more complete separation of nitrogen. This would also agree with the results from the analyses of the coal-pit gases. We find, however, as the result, that when the putrid matter is abundant, and the decomposition violent, there is less nitrogen ; when there is less putrid matter the decomposition is slower, and there is more nitrogen.

We must not forget, however, that some substances have so little nitrogen that they can at best give out little. This cannot be the result with the cereal vegetation. Is it so in marshes generally ?

Does pure woody fibre give out marsh gas ? If so, is nitrogen mixed with this gas ? If it is, then the air must be the source. Or is it only a somewhat azotized substance that can decompose and give out marsh gas ? The fact that some marsh gas is obtained almost free of nitrogen is against this. The other fact, that nitrogen is so generally in connection with marsh gas, may show that azotised bodies do putrefy most readily, even when surrounded with great excess of other bodies. This is the case, and may be the explanation.]

At any rate purer ponds give out more nitrogen ; impure bubbling filthy matter gives out little. This may be used as a kind of test of the state of waters.

Besides these gases, and others, known and unknown, which have been examined, there is a fœtid matter, and also a substance containing nitrogen and carbon, and evidently of an organic origin. This substance was retained by an alkali. When the putrid gas has passed through cotton wool, a substance is retained of an excessively disagreeable smell, more so than any other portion in liquid or in gas. We are not certain that the substance could not communicate its putrid state to other bodies without the intervention of organisms, although we quite know that the larger results of putrefaction, namely, the gases mentioned, are quite incapable of this communication. If, however, the communication to bodies at a distance takes place by means of a chemical substance, that substance must have some definite shape and size. If it were a mere gas, it would instantly expand on coming in contact with the air, and become so divided as to cease to have any influence. If it were a vapour, such as water, or any of the acids or fats which pass off along with the gases, the same infinite attenuation would take place when mixed with the air, and this extremely fine division would, as far as we know, entirely prevent any action. In other words, the power would be diminished in exact proportion to the amount of air with which the gas was diluted. In

* Jahresb. ; Liebig and Kopp, vol. 4.

order that a substance should act like yeast, it must at least have parts to decompose; but in the state of division, attained by gases mixing with great volumes of air, the limit of size seems so nearly approached that the idea of parts separating, and so communicating their habit of separation in this state of division, is against our conception, which rather represents them as having arrived at atomic division, or at least that of the undivided molecule. But if we examine the action of sulphuric acid, water, and zinc, we find that the particles of acid and water which are lifted into the air by the effervescence float about the apartment, and are carried to a considerable distance. They are globular bodies visible to the naked eye, purely chemical, and not organized substances. We might suppose bodies to arise from putrid matter in a similar way, and by this means we can picture to ourselves the conveyance of substances in a state of decomposition, planted, as germs would be, upon fresh matter ready to yield to its attacks, but not germs in any true sense of the word. We can imagine that even one of these particles could be carried over an immense district of ground, and deposit itself on some spot, favourable or otherwise to its action. This at present is a fair subject of inquiry; we cannot say whether it really takes place or not, but it is hard to think otherwise. Such substances like particles of floating pus are retained by wool.

Let us, however, take the other view of the question, that the disease is propagated by organic germs. They may be tossed about, but their diffusion in the chemical sense into the atmosphere is impossible; they have a distinct, definite size; must be carried forward by the atmosphere, and will occasionally deposit themselves. If they float about very much in the atmosphere, both they and the chemical particles mentioned will become dried up. In that case activity might be destroyed, but less so in the case of the germ. If the germ were deposited in a place where there was abundant matter in which it could grow, to produce either a further advance of itself, or multiples of itself, it is easy to imagine that that place would become infected. If the germ fell upon a spot in which there was none of this matter capable of reproducing it, the germ would cease to be a conveyer of infection; and so we can explain to ourselves why one place becomes capable of fostering disease and another not. This view does, in fact, seem to explain many of the apparent vagaries, if we may so speak, of cholera and of plague. These diseases start up strangely, often in places where they would be least expected. Germs may be conveyed as the wind or other agents may choose to move, and houses, where persons are in all respects cleanly in their habits, may be occasionally subjects of their attack. But this does not contradict the great rule which seems everywhere observed, that they should settle down in places where is found such natural food as animal and especially decomposing animal and vegetable matter and close dwellings always provide, unless when the germs grow better in living animals.

These two explanations are not mere fancies. It may be affirmed that both methods are productive of decomposition in bodies and also of disease. We require no change in our reasoning to explain all diseases by them. We extend only the known to the less known and the unknown.

There seems no reason to limit the number of infectious diseases, till the number of chemical substances transferring decomposition is limited also, and until the number of germs, and the list of their transformations, is finally completed and made known to us.

Natural disturbances on a great scale cannot be denied a wonderful influence, but on them we cannot operate. Disinfection, on which I am deputed to write, can be applied only to organic bodies, and the substances which they use for their multiplication or the retention of their activity. I am reviewing phenomena so as to explain why chemistry has work to do here, and to enable us to understand why disinfection can be valuable. It is desired also to picture clearly the condition of the question.

The word "disinfection" is not older, I believe, than the last century; it is applied to the removal of all disagreeable gases and odours, as well as to the decomposition of bodies which produce them. It includes also the term "deodorising."

Properly speaking, the prevention of decomposition, and the destruction of foul odours, when formed, require separate names. The first is performed by antiseptics, or bodies which prevent putrefaction; the second may be supposed to be the part played by disinfectants, which remove the putrefactive condition when begun. In ancient times, the use of antiseptics was studied to a greater extent than at present, and some of the most important proofs that we can obtain of their success are to be found in the habits of early Egypt. We there find that organic matter of the kind capable of decomposing in the manner most dangerous to health can be preserved for 3,000 years without any injurious influences. We have not till lately understood the value of drainage as a disinfectant, nor have we till this century been equal to ancient Rome in the knowledge of the method of sewering towns and preventing injury from sewage gases; whilst for some ages all Europe seems to have lost that acquaintance which the ancients had gained, after so much fatal experience, concerning the dangers of close habitations and filthy streets and houses. It is curious to observe how slowly we proved the value of sulphurous acid or burnt sulphur as a disinfectant, although Ulysses seems before historic times to have used it as a common method of purification where dead bodies were found lying. It is equally curious to find ourselves, after very laborious chemical researches, discovering the substance which we have called creasote (carbolic acid) although its preparation is explained by Pliny, and its use for preserving bodies, for preventing the skin diseases of cattle, and for removing toothache, is very clearly explained.

Fire, water, washing with alkalis, use of perfumes, and combustion of aromatic substances, seem all to have been used in early times. Boyle seems to have revived the study in the 17th century, showing the influences of heat and of cold. Sir John Pringle made a careful examination, and published his experiments, of septic and antiseptic substances, with remarks relating to their use, in the Theory of Medicine, in 1750. "Animal fluids," he observes, "will remain long without putridity if kept from the air." Alum was found by him to prevent, but not to remove, putrefaction; and he adds, that astringent mineral acids and ardent spirits not only absorbed the matter from the putrescent substance, but likewise crisped up its fibres, and thereby rendered it so hard and durable that no change of combination will take place for many years. After this, in 1773, Guyton Morveau proposed fumigation with muriatic acid vapours, and made great advance; and Dr. Carmichael Smyth obtained a reward from the English Government for his discovery of the use of nitrous fumes as a means of fumigation. In 1791, Fourcroy first brought forward chlorine gas as a fumigating agent and disinfectant, which was introduced into England by Dr. Cruikshanks. Berzelius says that animal liquids may be long prevented from decay by occasionally heating to 100° centigrade, in order to remove the oxygen absorbed; another says, 60 centrigrade, or 140° Fahrenheit. Sweeney preserved meat in water by first boiling out the air, cooling it, covering it with a stratum of oil to keep out air, and adding iron filings to absorb what might have been allowed to enter. Meat remained sweet in this way for several months. Leuch added a covering of oil also, but used unboiled water and sulphur instead of iron filings. Meat was preserved in this way for two months. Dr. Henry showed that at a temperature of about 140° Fahrenheit vaccine matter had entirely lost its peculiar properties. He kept up the

temperature for three hours. If heated for three hours at 120° Fahrenheit it still retained its vaccine properties. Dr. Henry also showed that the clothes of fever patients were disinfected by exposure for one hour to a temperature of 200° Fahrenheit. Mere drying is known to arrest decay. It is an old saying, that bodies, unless dissolved, do not act on each other. The power of cold to arrest the movement of particles, chemical as well as mechanical, is well ascertained.

The history of disinfection before the rise of modern chemistry is extremely interesting. Even modern chemists may learn much from the practice of the ancients, but for our present purpose I must be contented with these few allusions.

Since writing the above a paper has been sent me describing what is called the Danish method of fumigation by the use of muriatic acid. Common salt may be used, by pouring vitriol on it without heat, but nitric acid may also be used, it is said, which, however, makes a great alteration. It is well to give Guyton Morveau his full due. The Chancellor of the Legion of Honour writing to him in the name of the Emperor Napoleon in 1805 says, "Europe "and America know that since 1773 you have em- "ployed your discovery of the application of "muriatic acid fumes to arrest the effects of con- "tagious and direful diseases." He obtained for it the brevet of an officer of the Legion of Honour. This is in the preface to the "Traité des Moyens de "désinfecter l'Air de prévenir la Contagion, et d'en "arrêter les Progrès." 1805.

Nitric acid on salt produces chlorine and nitrous gases. These latter ought never to be used where men are, and no doubt the lower animals will be similarly endangered.

Present Practice of Disinfection.

The art of disinfection is so little practised, and the theory so little developed, that we can scarcely fix upon any generally recognised modes of procedure. Perhaps, of all substances, that most used in England and best known is chloride of lime; and certainly it is a very powerful agent. In France, chloride of potash (soda), *eau de Javelle*, is most used in private houses, and chloride of zinc for the disinfection of cesspools. The latter is otherwise called (Sir William) Burnet's Disinfecting Fluid. In Germany, I believe, salts of iron are more used, when anything is used. With us, chloride of lime is sometimes used at railway stations, and sometimes in private houses, when the public becomes alarmed. For stables, cowhouses, and middens, no disinfectant is used as a rule, although some have for many years employed in such cases McDougall's Disinfecting Powder. Earth, charcoal, and sulphate of lime have all been employed in such cases, but perhaps of these charcoal is the only one which has been used to a great extent, and that chiefly for the ventilation of sewers, and the purification of air passing into the lungs through a respirator. This use has arisen from the investigations of Dr. Stenhouse, who first showed the power which charcoal exercised in compelling the oxidation, as it were, of organic vapours and gases, which were known to be greatly absorbed into its pores. Chloride of manganese and chloride of iron have both been proposed as disinfectants for sewage; but I am not at all aware that they have ever been used to any great extent, although their power of disinfecting is known to be great. Soot, ashes, charcoal, animal charcoal, and peat charcoal have all been proposed, and some of them are used, according to convenience. There seem, in fact, to be few substances in nature incapable of acting partially as disinfectants, the putrid fetters themselves excepted.

Many as the propositions have been it is remarkable how objections have risen against all. As is natural in this country, water has been considered to be the only substance which may be relied upon as a perfect disinfectant. Although it is difficult, even in this country, to obtain a sufficient amount of water to purify our towns, and absolutely impossible to obtain sufficient to wash away the impurity without making the process of purification itself offensive, engineers, consulted on the subject, seem to have insisted that the same abundance of water should be used even in the hottest climate, and the use of disinfectants has been discouraged abroad as well as at home. Permanganate of potash, or Condy's Disinfecting Fluid, being one of the most elegant and rapid of disinfectants, is gaining access into private houses. If it were equally antiseptic, it would probably establish itself in such a manner as to make the selection of substances less difficult than it now is. As the matter stands, we have a large collection of facts, very many proposals, and a very irregular practice. In this state of things it is proposed to examine the action of the principal substances, and to choose for ourselves such as seem most fitted for our purpose, leaving the matter still open, it must be confessed, for abundant difference of practice.

Action of Disinfectants.

General.

Many substances prevent the decay and putrefaction of organic matter. These are antiseptics, and they have also been called disinfectants. Flesh is preserved for a long time in spirits, and appliances of various kinds have been used for the preservation of bodies. These purposes have not been so much required in modern times; but the knowledge of the unwholesome nature of gases from putrefying matter has spread so much of late years that the use of some agent to prevent decomposition has been very much sought, and many disinfectants have been proposed. Animal matter, which chiefly is found to be dangerous, is, in fact, the fæces or *dejecta* of human beings and of cattle. It might be supposed that these substances had already been decomposed; but such is not the case. The decomposition is very imperfect, and when they are allowed to stand, putrefaction sets in, closely allied to, perhaps exactly the same, as that which takes place in other animal matters, such as blood, or in a mixture of flesh and water. When these substances decompose, the result is, as far as we know, nearly the same as the decomposition of the entire animal body. We are not able to tell the difference between the products of putrefaction from our cesspools and those from our graveyards. The problem, then, of preserving meat, or of preserving the entire animal from corruption, and the problem of preserving sewage and fæces from decomposition, become entirely one and the same. We are required to do for the fæces that which the Egyptians did for their dead bodies, until they shall be thrown upon the ground, and mixed with the soil and become the food of plants. As instances of the action of antiseptics, see the results of various modes of treatment of the dead. In most cases when coffins have been opened, either there has been only a small amount of ash remaining, or if the form has been preserved entire it has fallen suddenly to a minute heap of fine ash the moment it has been shaken or acted upon by the wind. The reason of that no doubt is that air has gradually entered by minute pores, although very slowly, the carbon has been removed in the form of carbonic acid, and the oxygen, hydrogen, and nitrogen would soon follow. The fine ash or dust is the phosphate of lime, which is not hardened, as in burnt bones, and has no support. When, however, antiseptics have been used, the whole seems to have been preserved, as in the case of the mummies of Egypt. Some substances, like the metallic salts and mineral acids, generally combine with the flesh or with portions of it, and by making a permanent compound prevent the action of air. Some substances, such as charcoal, condense the oxygen within their pores, and assist the destruction of the animal matter. Others, like permanganate of potash, give out the oxygen, which

Dr. Angus Smith. Report to Commissioners.

they contain in large quantities, and thus hasten the formation of carbonic acid. Some of them, like chloride of lime, give out oxygen and other gases —in this case chlorine, &c.; and some of them, like sulphurous acid, act by taking oxygen from the substance to be disinfected, so that there is a surprising variety in the modes of action. Of these substances, however, we might say there are two classes; those which act upon the solids and liquids, and those which are volatile and act upon the air. Let us suppose one, either of the particles or germs of which we spoke, to come into a stable and fall upon some material ready to supply it with food, it will grow; but suppose that material should have been treated with a chemical substance, say chloride, the germ would itself be poisoned and growth would cease. Let us suppose, however, that same germ, instead of lying upon a disinfected substance, had entered into the lungs of the animal. The question may be, Can it be taken up into the vital system? We know that when some germs enter into the corner even of a large vessel containing blood, putrefaction goes on from beginning to end. We can readily imagine a similar result in an animal, for, although the effect may not be properly called putrefaction, still it is a disease somewhat analogous in its nature. The disinfection of the manure, or of the cow-house or stable, in such a case, would have no effect upon the animal, if the disinfectant itself were not volatile, except in a secondary manner, by preventing the atmosphere from being filled with the volatile substances from the manure. The use of such solid disinfectants would therefore be valuable, but limited. If, however, the disinfectant were capable of acting first upon the solid manure and liquid itself, and then, rising up into the atmosphere, pervading every corner of the apartment, the result we might expect to be very much more important, that is if the disinfectant should be found to be capable of destroying the vitality of those germs themselves. When also this disinfectant continually entered into the lungs, mouth, or skin along with the atmosphere, we might look to that as a still further precaution.

It is now many years since Mr. McDougall and I proposed the use of mixed carbolates and sulphites. In a pamphlet which he wrote upon the subject he has shown that the dung heaps from those cowhouses and stables where his powders had been used had not become hot, as other heaps of manure became, showing that they did not take up oxygen, and that they were not decomposing. He showed also that the crowd of flies which continually hums about dung heaps in warm weather was entirely absent, and that the cattle in the stables were much more at rest from their absence. Having examined by the microscope land which has been treated with manure disinfected by similar means, I have found it entirely free from any animalcular life; and, in a paper upon the production of malaria, I showed that by simply keeping the ordinary soil of our fields in contact with stagnant water, or, in other words, without changing the water, an enormous development of animalcular life took place, with common putrefaction, if the soil were what is called rich. This I assumed to resemble a production of artificial malaria. When these animalcules were treated with a solution used for disinfecting the sewage on land at Carlisle, and containing in part tar acids, they almost instantly died. Therefore the land thus treated is on an entirely different condition from every other soil; it is incapable of nourishing even the smallest class of living creatures, much less the larger form of grubs and worms, whilst it is a very rich soil for grass. I may quote a few words from the paper referred to:—

"Now I am not prepared to say that all unhealthy districts actually contain a large amount of matter, either putrefying or forming into animalcular life, but it certainly is the characteristic of what seemed to me to be the soil most blamed; there may be some, as already stated, where other causes arise. This state of soil is that of all our lower lands; the ditch water swarms with life; muddy wet lands present it in every drop of water; whilst in our high hills, purified by barrenness and disinfecting peat, we have hunger and health. I do not say that there is a necessary connexion between malaria and animalcules, but as there is a connexion between them and the state of the air in our own county, it is probable that the inquiry may be extended profitably to malarious districts. Infusoria and even larger animals indicate the presence of matter which may putrefy, but it is even probable that they may prevent its injurious action on the atmosphere."

For these reasons I proposed at the time to introduce the microscope, as to some extent an instrument for ascertaining the sanitary condition of the country. To what extent it may be used is a matter which must be afterwards learnt. I proposed the use of disinfectants also over malarious grounds, believing that in many cases they could be used so extensively as to influence the climate, and especially in such places as railway cuttings in India, where our engineers are at work suffering severely from malaria, which is still worse when the ground is turned up. For the same reason I proposed that instead of using disinfecting materials for the treatment of sewage after it had left the towns, it should be disinfected during its passage through the towns, so that the inhabitants might have the advantage of the disinfection.

In the use of disinfectants it is necessary to distinguish between those which may be used for occasional purposes and during great epidemics, and those which may be constantly used. It will be important for the farmer to use those which have a beneficial effect upon his manure, and which retain all its fertilizing properties, and, besides, it is necessary that they should be agreeable to the cattle, and that they should be agreeable also to the senses of those who are going about. Chloride of lime, which has been so very much used, has scarcely all those properties. It destroys ammonia, a most valuable agent in manure, and it destroys also urea and uric acid, whilst it often destroys more permanent compounds than these. When it has ceased to act, it leaves a chloride of calcium, a substance which imbibes water with great greediness, and it therefore is disagreeable in a stable or cowhouse, where it is rather necessary that a dry substance should be used which will imbibe the moisture. Cattle also seemed to have a great dislike to the smell of chloride of lime. Its action upon the atmosphere is scarcely sufficient. The chlorine is not sufficiently volatile unless means are used to disengage it. It would therefore be an expensive and destructive disinfectant for manure. The use of charcoal is subject to similar objections; it is destructive of animal matter; it absorbs the gases which arise during decomposition; but it destroys the organic compounds, and forms more simple compounds in their places; and it is incapable of acting to any great extent, unless it covers the substance to be disinfected. Not being volatile, it has no influence upon the air at a distance from the place where it is laid, or has, at most, a very slight influence, by purifying such parts as circulate and rest a while on it and leave it.

I have not made a formal division of disinfectants, nor have I attempted to separate them from preservatives, antiseptics, and deodorants. It seemed to me that to make any change on the present rather loose mode of expression would be scarcely advantagious until the true action of many of them was ascertained. Some antiseptics act evidently by combining, some by oxydizing, some apparently by removing one element necessary to the usual decomposition, and so disarranging proceedings, whilst some are simply, so far as we can see, *colytic*, that is, restraining. This is a word which I introduced some time ago to express that quality, whatever it be, by which the evident inclination to move is arrested, and is in distinction to that used by Berzelius *catalytic*, which is the inclination to break up. (The word *colytic* is derived from the verb κωλύω and adjective

κωλῦτικός. The act then will be called *colȳsis* (κώλῦσις).

Experiments relating to the preservation of organic bodies.

The method of inquiry pursued for this report was the following :—

It was first determined to find those substances which prevented solid organic bodies from decomposition. This was done, bearing in mind the facts alluded to, that decomposition takes place after contact with an atmosphere of a particular kind. In the purest air oxidation will take place, and carbonic acid will be formed from flesh and blood; but when that air contains substances that ferment or otherwise cause decomposition, how are these substances to be removed? We cannot filter them out practically on a large scale; can we destroy them, or render them ineffective by means that are within our every day control?

No. 1.

Meat was treated with the vapours of the following substances :

Acetic acid.
Alcohols :
Methylic (wood spirit).
Ethylic (common spirit of wine).
Amylic (fusel oil).
Phenic (carbolic acid).
Cresylic (cresylic acid).
Wood kreasote.
Aniline.
Binoxide of hydrogen.
Bromine.
Camphor.
Gum Asafœtida.
Heavy oil of tar.
Iodine.
M'Dougall's powder.
Naphtha.
Naphthaline.
Nitro-benzole.
Oil of aniseed.
„ bergamot.
„ bitter almonds.
„ bitter fennel.
„ cinnamon.
„ cumin.
„ garlic.
„ hop.
Oil of horse radish.
„ juniper.
„ lavender.
„ lemons.
„ mustard.
„ onions.
„ orange peel.
„ pepper.
„ peppermint.
„ rosemary.
„ rue.
„ thyme.
„ valerian.
Ozone.
Pyroligneous acid.
Turpentine.

In this class there is no difficulty or hesitation; every experiment is clear and distinct, and can be repeated easily. The object of the inquiry was to find those substances which, in a volatile condition, prevented putrefaction in an atmosphere which could easily be breathed. It was made by pouring into bottles of about 900 cubic centimetres volume—equal to about a pint and a half—from 5 to 9 drops of these volatile substances. Over this was suspended a piece of meat about three inches in length and about three fourths of an inch in diameter. It was not brought in contact with the substance; the cork was put loosely in the bottle, which was opened generally every day, no attempt being made to keep out the atmosphere.

These experiments are very satisfactory, and if our theories of floating active organic substances be correct, the question as to the possibility of their destruction or infection in this manner seems to be settled, so far as this treatment goes. But to this also something is wanting. It is desired to know at what distance that flesh may be suspended with safety, as it was clear, in all cases where there was visible action on the meat, that it was most violent at the lowest part, where it was nearer the liquid. In the best case of preservation there seemed no difference, as the flesh was unaltered throughout, to all appearance, except where difference of colour, as already mentioned, was produced. The slightest alteration took place with cresylic acid; it seemed to be quite suited to excite the appetite. It appeared cooked. It was overdosed even with this small quantity. When aniline and coal naphtha were used the pieces of meat were perfectly preserved from putrefaction, but had an appearance scarcely resembling flesh.

Results of Experiments made in order to ascertain the Influence of Volatile Substances in preventing Putrefaction.

The Experiments were made on Pieces of Lean Flesh (Beef), all cut from the same Piece. The Beef was exposed to the Vapour of the various Substances by suspending it in Bottles at the Bottom of which a small Quantity of the Substance was placed. The smell in all cases so that one could easily breathe, with Phosphorus excepted.

	1865.					1866.
	Nov. 29th, after 6 days	Dec. 5th, after 12 days.	Dec. 10th, after 17 days.	Dec. 15th, after 22 days.	Dec. 26th, after 33 days.	Jan. 13th, after 51 days.
Flesh—alone	Putrid and whitened.					
With phosphorus in water	Not bad, but whitened.	Bad smell	Flesh beginning to be bad, although the bottle is full of ozone.	Diminishing in size; black.	Very small, black and hard; watery solution clear, containing acid and ammonia.	
Naphthaline	Rather bad, not whitened.					
Cresylic { alcohol / acid }	Very sweet; scarcely altered in colour.	Quite sweet; slightly whitened.	As on 5th Dec.	As on 5th Dec.	Still fresh	Quite fresh.
Carbolic (phenic) { alcohol / acid }	Fresh, a little whitened.	Fresh; a little darkened.	As on 5th Dec.	More smell than cresylic acid.	Still fresh	Quite fresh.

	1865.					1866.
	Nov. 29th, after 6 days.	Dec. 5th, after 12 days.	Dec. 10th, after 17 days.	Dec. 15th, after 22 days.	Dec. 26th, after 33 days.	Jan. 13th, after 51 days.
Coal naphtha	Fresh; a trace of discoloration.	Sweet, and red natural colour; slight sliminess below where nearest the naphtha.	As on 5th Dec.; sliminess increased.	No bad smell, but slimy and red, as if disintergrating.	Decomposing; soft and oily-looking.	
Canadian petroleum (crude)	Putrid; colour darkened.					
Aniline	Uncertain; slight whitening.	No putridity; colour dark, not pleasant to look at; smell of aniline, also unpleasant.	As on 5th Dec.	As on 5th Dec. unpleasant smell.	Not putrid, soft and deliquescent.	Not putrid, soft and deliquescent.
Nitro-benzole	Sweet; very slightly coloured.	Bad, black.				
Turpentine	Slight decay; colour good, especially below nearest turpentine.					
Kreasote	Very sweet; slightly darkened on some places.	Fresh, dark	Blacker	More blackening	Fresh	Still fresh, but a little darkened.
Wood naphtha	Fresh; very much whitened.	No putridity; flesh very light and dry.	Whiter, but otherwise, as on 5th Dec.	As on 10th Dec.	Fresh and white	Fresh and white.
Pyroligneous acid	Sweet; very white.	Fresh, white	As on 5th Dec.	Mouldy, but no putrid smell.		
Acetic acid (pure)	No smell; colour dark.	Fresh, but very dark colour.	Very black	Very black, slimy below; pleasant acid smell.	As on 15th Dec.	Not putrid, but unpleasant to look at.
Camphor	Bad: slightly darkened.					
Oil of cinnamon	Rather bad; whitened.					
Oil of mustard	Fresh; colour greyish white.	Fresh; very white	Fresh; colour greenish yellow.	As on 10th Dec.	Fresh	Fresh.
Oil of bergamot	Slight decay; slight darkening.					
Oil of bitter almonds	Fresh; good colour.	Fresh	Fresh	Fresh	Fresh	Fresh.
Oil of pepper	Beginning to decay; a little whitened.	Bad; slimy	Like bad fish.			
Oil of cumin	Fresh; colour good.	Bad; slimy.				
Oil of lavender	Fresh; colour good.		Bad.			
Oil of hops	Fresh; colour a little dark.	Bad.				
Oil of thyme	Bad; colour lightened; surface soft.					
Oil of rue	Good; colour a little light (bad smell of rue).	Not putrid, but slimy.	Dreadfully blotched.			
Oil of rosemary	Fresh; colour good, a little light.	Going bad.				
Oil of juniper	Very fresh; colour good.	Going bad.				
Oil of orange peel	Beginning to decay; colour fair.					
Oil of peppermint	Very fresh; colour pretty good.	Not very bad smell, but very slimy.				
Oil of lemons	Bad; colour bad; surface becoming soft.					
Oil of valerian	Doubtful; a little dark.	No bad smell, but slimy.				
Oil of aniseed	Bad; colour not much changed.	Going bad.				
Fusel oil (amylic ether)	Sweet; very slightly whitened.	Sweet; good colour.	As on 5th Dec.	As on 5th Dec.	As before	Still fresh.
Essence of pine apples (butyric ether).	Sweet; slightly whitened.	Fresh, a little dark.	As on 5th Dec.	Mouldy, but no bad smell.		
Gum asafœtida	Not so putrid as flesh alone; colour not bad.					

COMPARATIVE ORDER, and POSITION in each ORDER, which the following Substances occupy in respect to their power of Preserving Meat. (1 highest power.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Cresylic acid. Fusel oil.	Carbolic acid. Kreasote.	Oil of mustard.	Wood naphtha. Oil of bitter almonds.	Acetic acid. Pyroligneous acid. Ess. of pine apples.	Coal naphtha.		Oil of juniper Aniline. Oil of peppermint. Oil of rue.	Turpentine. Oil of lavender. Oil of valerian. Phosphorus and water. Oil of cumin. Oil of rosemary Oil of hops.	Oil of cinnamon. Oil of thyme. Oil of orange peel. Oil of bergamot. Oil of pepper. Naphthaline nitre; benzole camphor. Oil of lemons. Oil of aniseed. Gum asafœtida. Crude Canadian petroleum.
	Preserve equally long with the first, but colour not so good.								

The results of these experiments is, that fusel oil, methylated spirits, carbolic or phenylic alcohol, cresylic alcohol, oil of mustard, and oil of bitter almonds, with pyroligneous acid, preserve the meat fresh, that is, with a pleasant odour. Aniline prevents true putrefaction, or that of the usual kind, but seems to begin another. Acetic acid seems to have an action too powerful. Several preserve for some days, and retire from the conflict. Time seems to have no influence on some of them, but the best of the pieces are preserved mainly by one class of substances only, and these turn out to be alcohols. Mustard oil preserves well, but it threatens to harden the flesh, and the colour is much changed Oil of bitter almonds seems to preserve well, but the flesh is losing its firmness, whilst, in the case of the alcohols, there seems to be no drawback. It is curious indeed if this should turn out to be a property of this series of bodies. The composition is here added in order to show that they stand to each other as homologous compounds.

In the natural order, so to speak, the cresylic and carbolic compounds would be called acids, because acidity is the more sensible quality; but by their composition they take the place of alcohols. We have then disinfectants which form a chemical series :—

Alcohol :

Methylic	$C_2 H_4 O_2$, or $C H_4 O$
Ethylic	$C_4 H_6 O_2$, or $C_2 H_6 O$
Amylic	$C_{10} H_{12} O_2$, or $C_5 H_{12} O$
Carbolic (phenylic)	$C_{12} H_6 O_2$, or $C_6 H_6 O$
Cresylic	$C_{14} H_8 O_2$, or $C_7 H_8 O$

and wood kreasote, which, I suppose, is a mixture of the latter two.

The exact order of these substances as disinfectants had not been made out, but it seems to have some relation to the order now given. Cresylic alcohol seems to preserve meat best under certain conditions, to be pointed out afterwards. Amylic preserves remarkably well, but the two evidently act in a different way. I am not here preserving meat for food; I am speaking of the preservation of animal substances, and mean to apply these results to manures and to living animals first. The use of amylic alcohol in the above method as a preserver of flesh might probably be very hurtful, as the use of too much cresylic or carbolic would be.

These vapours completely prevent the action of the air, and of the bodies, organic and organized, that the air may bring with them. If the diseases attacking us or our cattle resemble such bodies, they will also be rendered innocent by the use of these vapours.

A very serious question, however, arises : If the disease is slain, is the living being preserved ? The action on living creatures is more difficult in many cases than that on dead. It is more difficult to act by oxidizers and some other agents on fresh meat than on corrupted, although, if we consider the blood as living and the skin as dead, the reverse is the case.

However, the practical question is, can the larger animals live in an atmosphere so filled with these vapours that meat will not decompose ? If this is answered in the affirmative a great deal is gained. I may say all is gained. It may probably turn out that the resistance will be sufficient for some of the putrid matter or the germs, and in this case the disease they brought would be warded off, whilst it might be insufficient in other more violent cases. This is the point to be practically ascertained. We must remember, however, that it is simply a question of strength,—who will bear most, the disease or the diseased. These colytic agents are so powerful that they can arrest the life as well as the corruption. Experience, however, is in favour of the vigour of life. I have heard of no one being injured by breathing air scented by carbolic and cresylic acids all day for a long time together, and I have myself breathed them night and day in a mild state. Very strong they must never be breathed, and never touched as liquids, as, although mild at first to the taste, they remove the skin. The above experiments were all made at a temperature varying with the season.

I am sorry I have not yet obtained the extreme limits or the smallest amount of cresylic vapour for a certain quantity of material or a given volume of air. This will require some time.

Our ancient and admired disinfectants must now learn to retire on great emergencies. Rue, rosemary, lavender, and pennyroyal may still be used to prevent attacks on our clothes, or to scent the wardrobes; but when the preservation of matter for a long time is the question, they must be left aside. They are like the mild precautions of a time of peace.

Those substances which have preserved the flesh and not destroyed the fibre will preserve also the putrescible matter in manures, and prevent it sending impurities into the air. This is ascertained beyond doubt. The vapour at a low temperature destroys the substances causing putrefaction. That also is ascertained. We require only to use it until we ascertain if it will destroy every kind of substance that causes every kind of putrefaction. If every kind is not destroyed, how many kinds ? Probably the pus, ferment, or germs will be preserved as soon as the vapour touches it, and will remain as unchanged and as innocent as a mummy until washed into the earth, and destroyed by air, water, and vegetation.

No. 2.

The efficiency of strong gases and volatile substances in preventing putrefaction.

In order to gain information on this point, pieces of meat about an inch broad and thick, and about three inches long, were placed in bottles containing the following gaseous and volatile bodies :—

Chlorine.	Sulphurous acid.
Bromine,	Protoxide of nitrogen.
Iodine.	Hyponitrous acid.
Hydrochloric acid.	Hyponitric acid.
Peroxide of hydrogen.	Ether.
Ammonia.	Heavy oil of tar.
Carbonic acid.	McDougall's powder.

The chlorine was prepared from chlorate of potash and hydrochloric acid; the sulphurous acid from sulphite of soda and sulphuric acid; the hyponitric acid from copper and strong nitric acid; the hyponitrous acid from copper and weak nitric acid; the hydrochloric acid from common salt and sulphuric acid; the ammonia from lime and sulphate of ammonia; and the protoxide of nitrogen from nitrate of ammonia.

The gases were passed into the bottles for a considerable time, which were then closed up by corks covered with paraffin, the meat being suspended inside by a string. They were kept in the laboratory at a temperature of 60° to 70° F.

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TABLE showing the effects of Gases, &c., on Flesh.

	Time elapsed since the fastening up of the Bottles.		
	7 Days.	14 Days.	28 Days.
Chlorine	Bleached and hardened a little. The bottle smelt only slightly of chlorine. Quite good.	In appearance Unchanged. No chlorine in the bottle.	In appearance Unchanged; meat red inside; only bleached on the surface.
Bromine	Whitish yellow in colour. Slight smell of hydrobromic acid. Quite good.	Unchanged. Faint smell of hydrobromic acid.	Slightly pinkish in colour; faint smell of hydrobromic acid. Quite good.
Iodine	Dark yellow; dried. A little iodine in the bottle. Quite good.	Unchanged	Orange red, white inside; no smell of iodine. Quite good.
Hydrochloric acid	Darkened; no smell of hydrochloric acid. Quite good.	Unchanged; no hydrochloric acid present.	Unchanged.
Ammonia	Darkened; the meat smelt of ammonia, but the bottle did not. Quite good.	Unchanged; no ammonia present.	Unchanged.
Protoxide of nitrogen	Sweet fresh smell; a little lighter in colour. Quite good.	Become mouldy; a fine red colour.	Meat bad; lighter in colour.
Hyponitrous acid	Light yellow, from a little hyponitric acid. Quite good. Hyponitrous acid still in the bottle.	Unchanged. On taking the cork out, no hyponitric acid was formed, showing an absence of hyponitrous acid.	Unchanged.
Hyponitric acid	Light yellow and dried. No red fumes in the bottle. Quite good.	Unchanged	Unchanged.
Carbonic acid	Smell bad and meat slimy.	——	——
Sulphurous acid	Not quite so red. Quite good, smelling of sulphurous acid.	Smell of sulphurous acid. Quite good.	Unnatural pink colour; smell of sulphurous acid. Quite good.
Ether	Not quite so red, but quite good.	Unchanged; ether vapour present in the bottle.	Unchanged; faint ethereal smell.
Heavy oil of tar	Putrid and slimy.	——	——
Peroxide of hydrogen	Putrid, slimy, and mouldy.	——	——
McDougall's powder	Putrid and slimy.	——	——

In these experiments we find that the powerful gases described are absorbed by the meat, and probably, as in the presence of the vapours of phosphorus, ammoniacal salts are formed, and, in the presence of water, solutions of certain portions of the nutritive matter, as in Liebig's extract of flesh. It seems to me, however, that a greater amount of gas is required in their case than in the case of the organic acids in No. 1. The gas required to be stronger, by which words is meant that it had more effect on the senses. I believe also that in actual weight the amount was greater; but this has not been proved.

The ether scarcely belongs to this set, but it is interesting to observe its effect, showing that the alcoholic series is not the only one which has a disinfecting power. It may be that it is the base which has the power, and that the hydrates only share it.

All the strong acids have completely destroyed the natural appearance of the flesh, and rendered it very unpleasant to the sight, but as preventives of putrefaction they are perfect. The least unpleasant is that in sulphurous acid; it is, however, of unfleshlike pink.

Nitric acid or any nitrous gases must be avoided where animals are. The senses do not perceive all the danger of this gas, and men leave it quite well to become ill in a few hours, and not to recover. Muriatic and sulphuric acids act otherwise. The senses are alarmed, and avoid them even where there is not sufficient to bring danger to the health, certainly none immediately; and, even when there is none prospectively, so far as we know.

Protoxide of nitrogen, of all substances tried, allowed mould to come most rapidly, and the quality was peculiar, but I am not acquainted with these bodies so as to describe them. It seemed to invite the mould. In all cases of mould the beginning was nearest to the cork, evidently finding entrance by the air.

McDougall's powder was tried here simply to see if it gave off carbolic acid enough to prevent putrefaction; it is found not to do so. This I find encouraging, as it has been extremely successful for some purposes without doing so; it shows that we have power in reserve, by using more tar acids, and acting more violently on the air, and thus preventing still more pertinaceous substances from intrusion than those usually dealt with.

No. III.

Disinfection in water.

The method in which the inquiry was made was as follows:—It was first determined to treat blood with small and constantly increasing quantities of the several disinfectants, in order to reach the point of perfect disinfection.

As it was impossible to obtain uniformity without removing the clot of the blood, the serum only was employed, and, as it was found inconveniently thick, it was mixed with twice its volume of water. It was believed that the gases escaping in this condition would be a measure of the amount and quality of the decomposition. The first experiments are made, but, as it will easily be seen, a very long series is requisite to arrive at the desired results. It would be impossible to finish these inquiries for the present report, but, as they already stand, a considerable amount of information is to be obtained. It is already seen which are by far the best disinfectants, but it is not clear to what extent the decomposition of organic matter proceeds along with the appearance of sulphuretted hydrogen. It is quite possible that that gas may diminish the amount of organic decomposition. It evidently arises from the sulphates, and is not a measure of organic matter, although itself bad enough. The rapid evolution of sulphuretted hydrogen was considered as one indication of imperfect disinfection; but with the sulphates this did not tell well. It may be that it is sufficient, and sulphuretted hydrogen may be considered as itself a sufficiently offensive gas, but, bad as it undoubtedly is, it cannot be considered as a nest for the growth of these organic substances or organized germs which we are supposing to be still more insidious. It was therefore desired to separate the sulphuretted hydrogen from the organic compounds for this purpose. The mix-

ture, after standing a suitable time, was distilled in part, and the first products of the distillation were treated with lead and with permanganate of potash. By these means we found the comparative amount of organic matter, and the results seemed to be regular. Fresh blood, for example, when distilled in this manner, destroyed only $\frac{2}{10}$ths of a cubic centimetre of chameleon; after standing 48 hours it destroyed $2\frac{2}{10}$ths; so that the rate of decomposition seemed to be measured in this manner. This method was not begun at first, or it might have been pursued further than it has been. It promises good results. Perfect it cannot be called as yet, as a more careful examination of the substances in this distillate is required. It must be examined whether this peculiar substance, giving a red colour with nitric acid, is a good measure of the impurity, or whether the salts obtained by acids and by chloride of platinum are something more than mere salts of ammonia. When carbolic acid is used, the first test is rather difficult, as this substance gives a reddish brown colour, obscuring the characteristic pink alluded to. The carbolic acid interferes also with the permanganate test, so that this is available only in the other cases.

Another method of trying the progress of disinfection was the passage of air through the liquid, and from that into permanganate of potash without distillation. Similar results were obtained in this manner, and it seems to be quite as good as distillation, whilst it is very much more rapid. One experiment may, in fact, be performed in five or ten minutes. This method has also one fault, viz., that it does not separate the organic matter from the sulphuretted hydrogen, but gives a gross result. These difficulties prevent us, without a great deal more labour, requiring very much time, from detailing with exactness the proportionate amount of decomposition in every case; but the great and broad results are certainly clear, and I shall therefore depend for the present upon them only, so far as this class of experiments is concerned. The peculiar pink colour in the nitric acid may turn out the best test; only one case has occurred where it could be proved absent.

Experiments on the action of Disinfectants in Water.

The disinfecting agents used in these experiments were the following :—

Arsenious acid.	McDougall's powder.
Carbolic acid.	Nitrate of iron.
Charcoal (animal).	Nitrate of lead.
Chlorate of potash.	Perchloride of iron.
Chloride of aluminum.	Sulphate of alumina.
Chloride of lime.	Sulphate of copper.
Chloride of lime and sulphuric acid.	Protosulphate of iron.
Chloride of sodium.	Sulphite of soda.
Chloride of zinc.	Sulphite of soda and carbolic acid.
Corrosive sublimate.	Sulphite of soda and cresylic acid.
Cresylic acid.	Sulphite of soda and sulphuric acid.
Heavy oil of tar.	
Lime.	

In order to investigate their action, bottles of about 1,800 cubic centimetres (about $1\frac{1}{2}$ quart) capacity were filled with filtered blood, which had been diluted with twice its weight of water, and treated with the disinfectants named above in proportion to the weight of the blood of $\frac{1}{1000}$ and upwards; the bottles were then placed in pans of water kept at a temperature of 80° to 86° F., and tubes arranged so as to collect the gases which were given off as decomposition proceeded.

The nature of the gas was in each case determined by analysis, and also its action on permanganate of potash; the rate at which it was evolved was also noted by observing the time it required to fill bottles of a certain capacity with gas, and calculating from this the number of cubic centimetres given off per week. Bunsen's method was employed.

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Bottle 1.

Blood unmixed with any antiseptic had a very bad smell after being kept 12 days. Lead paper held over it was immediately browned very strongly. It gave no fumes with strong hydrochloric acid, thus showing the absence of free ammonia. Quantity of gas collected, 65 cub. cent.; rate of evolution per week, 38 c. c. Permanganate of potash solution completely discolourized by 0·0025 cubic feet of air after it had passed through the blood. The permanganate solution was 0·1 c c. of a strong solution, diluted with 5 c. c. of water. The strong solution was standardized by iron wire dissolved in hydrochloric acid, and was found to contain 0·00048 grammes of active oxygen per cubic centimetre. On analysis, the gas proved to have the following composition in 100 parts :—

Carbonic acid - -	69·00 per cent.
Sulphuretted hydrogen -	6·68 „
Nitrogen - - -	24·32 „
	100·00

To ascertain whether the gas given off had a constant composition, blood untreated was kept for five weeks or more, and 65 c. c. of the gas were taken at the end of that period for analysis. The result is as follows :—

Carbonic acid - -	86·72 per cent.
Sulphuretted hydrogen -	13·28 „
Nitrogen - - -	
	100·00

Bottle 2. Carbolic Acid Proportion of disinfectant

Blood treated with $\frac{1}{1000}$ its weight of carbolic acid smelt bad; lead paper browned after being exposed a short time; no fumes given with hydrochloric acid. The time it was kept 17 days. Quantity of gas collected 65 c. c.; rate of evolution per week 26·76 c. c. The permanganate of potash test required 0·003 cubic feet of air to decolorise it. The composition of the gas proved on analysis to be as follows :—

Carbonic acid - -	69·89 per cent.
Sulphuretted hydrogen -	6·80 „
Nitrogen - - -	23·31 „
	100·00

Bottle 3. Carbolic Acid proportion of disinfectant $\frac{1}{10000}$.

Blood treated with $\frac{1}{10000}$ its weight of carbolic acid :—smell, very bad; lead paper browned immediately; no fumes with hydrochloric acid. Time kept 24 days. Quantity of gas collected 65 c. c.; rate of evolution per week 18·96 c. c. The permanganate of potash test required 0·0025 cubic feet of air to decolorise it.

Analysis of gas :—

Carbonic acid - -	29·02 per cent.
Sulphuretted hydrogen -	7·31 „
Nitrogen - - -	63·67 „
	100·00

Bottle 4. Cresylic Acid proportion of disinfectant

Blood treated with $\frac{1}{1000}$ its weight of cresylic acid: —smell, bad; lead paper browned immediately; no fumes with hydrochloric acid. Time kept 17 days. Quantity of gas collected 68 c. c.; rate of evolution per week 28 c.c. The permanganate test required 0·0025 cubic feet of air to decolorise it.

Analysis of the gas :—

Carbonic acid - -	66·99 per cent.
Sulphuretted hydrogen -	3·96 „
Nitrogen - - -	29·05 „
	100·00

Bottle 5. Chloride of Li proportion of disinfectant

Blood treated with chloride of lime :—smell, very bad; lead paper darkly browned immediately; no fumes with hydrochloric acid. Time kept 15 days. Quantity of gas collected 65 c. c.; rate of evolution per week 30·33 c. c. The permanganate test required

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0·005 cubic feet of air to decolorise it.

Analysis of the gas :—

Carbonic acid	78·61 per cent.
Sulphuretted hydrogen	4·20 „
Nitrogen	17·19 „
	100·00

Bottle 6. ride of Lime equivalent of huric Acid; ortion of nfectant $\frac{1}{1000}$.

Blood treated with chloride of lime, and an equivalent of sulphuric acid :—smell, very bad ; lead paper strongly browned directly ; no fumes with hydrochloric acid. Time kept 12 days. Quantity of gas collected 65 c. c.; rate of evolution per week 37·9 c. c. The permanganate test required 0·0025 cubic feet of air to decolorise it.

Analysis of the gas :—

Carbonic acid	45·22 per cent.
Sulphuretted hydrogen	4·64 „
Nitrogen	49·74 „
	99·60

Bottle 7. ride of zinc; ortion of nfectant $\frac{1}{1000}$.

Blood treated with $\frac{1}{1000}$ its weight of chloride of zinc :—smell, as good as that of fresh blood ; moistened lead paper exposed for five minutes not affected the least ; no fumes with hydrochloric acid. Time kept 22 days. Quantity of gas collected 4·5 c. c.; rate of evolution per week 1·43 c. c. The permanganate solution was not affected in the slightest degree by 0·150 cubic feet of air after it had passed through the blood.

The quantity of the gas was too small for analysis.

Bottle 8. hloride of ; proportion isinfectant $\frac{1}{1000}$.

Blood treated with perchloride of iron :—smell, like that of fresh blood ; no action on lead paper ; no fumes with hydrochloric acid. Time kept 7 days. Quantity of gas collected 70 c. c. ; rate of evolution per week 70 c. c. The permanganate solution was not affected the slightest, after passing 0·225 cubic feet of air through.

Analysis of the gas :—

Carbonic acid, Sulphuretted hydrogen	17·64 per cent.
Nitrogen	82·36 „
	100·00

Bottle 9. mon salt ; portion of nfectant $\frac{1}{1000}$

Blood treated with common salt :—smell not good ; lead paper browned, but not much so ; no fumes with hydrochloric acid. Time kept 18 days. Quantity of gas collected 65 c. c. ; rate of evolution per week 25·2 c. c. The permanganate test not tried.

Analysis of the gas, 1st time :

Carbonic acid	84·26 per cent.
Sulphuretted hydrogen	4·62 „
Nitrogen	11·12 „
	100·00 „

2d analysis 8 days after the former one, and 26 days after the sealing up of the bottle :

Carbonic acid	94·93 per cent.
Sulphuretted hydrogen	2·53 „
Nitrogen	2·64 „
	100·10 „

3d analysis, after 49 days :

Carbonic acid	81·07 per cent.
Sulphuretted hydrogen	1·92 „
Nitrogen	17·01 „
	100·00 „

Bottle 10. phite of soda; portion of nfectant $\frac{1}{1000}$.

Blood treated with sulphite of soda :—smell bad ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 10 days. Quantity of gas collected 85 c. c. ; rate of evolution per week 59·5 c. c. The permanganate test required 0·0025 cubic feet of air to decolorise it.

Analysis of the gas :

Carbonic acid	82·72 per cent.
Sulphuretted hydrogen	4·30 „
Nitrogen	12·98 „
	100·00 „

Blood treated with sulphite of soda and an equivalent of sulphuric acid :—smell very bad ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 42 days. Quantity of gas collected 60 c. c. ; rate of evolution per week 10 c. c. The permanganate test required 0·0025 cubic feet of air to decolorise

The gas was lost in this case.

Sulph and a of sul acid ; of dis

Blood treated with arsenious acid :—smell slightly disagreeable ; after five minutes' exposure moistened lead paper was faintly browned at the edges ; no fumes with hydrochloric acid. Time kept 20 days. Quantity of gas collected 4·7 c. c. ; rate of evolution per week 1·64 c. c. The permanganate test required 0·015 cubic ft. of air to decolorise the solution.

The quantity of gas was too small for analysis.

Arsen propo disinf

Blood treated with McDougall's powder :—smell very bad ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 6 days. Quantity of gas collected 90 c. c. ; rate of evolution per week 105 c. c. The permanganate solution required 0·0025 cubic ft. of air to decolorise it.

Analysis of the gas :

Carbonic acid	70·56 per cent.
Sulphuretted hydrogen	4·74 „
Nitrogen	24·70 „
	100·00 „

McDo powd tion fectan

Blood treated with corrosive sublimate or bichloride of mercury :—smell almost as good as that of fresh blood ; lead paper moistened and exposed for five minutes not affected in the least ; no fumes with hydrochloric acid. Time kept 20 days. Quantity of gas collected 13 c. c. ; rate of evolution per week 4·5 c. c. Permanganate solution decolorized by 0·035 cubic ft. of air.

Not sufficient gas for analysis.

Bichl mercu portio fectan

Blood treated with sulphate of copper :—smell slightly disagreeable ; lead paper, after five minutes' exposure faintly browned at the edges ; no fumes with hydrochloric acid. Time kept 20 days. Quantity of gas collected 9 c. c. ; rate of evolution per week 3·15 c. c. Permanganate solution decolorised by 0·006 cubic ft. of air.

Not sufficient gas for analysis.

Sulph coppe portio fectan

Blood treated with sulphate of alumina :—smell bad ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 24 days. Quantity of gas collected 80 c. c. ; rate of evolution per week 23·3 c. c. Permanganate solution decolorised after passing 0·0025 cubic ft. of air through.

Analysis of gas :

Carbonic acid	39·58 per cent.
Sulphuretted hydrogen	9·63 „
Nitrogen	50·79 „
Hydrogen	—
Marsh gas	—
	100·00 „

Sulph mina; tion o fectan

Blood treated with sulphate of iron :—smell bad, of sulphuretted hydrogen ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 21 days. Quantity of gas collected 70 c. c. ; rate of

Sulph propo disinf

evolution per week 23·3 c. c. The permanganate solution decolorised by 0·0025 cubic ft. of air.

Analysis of gas :

Carbonic acid - -	89·53 per cent.
Sulphuretted hydrogen -	10·47 „
	100·00 „

Blood treated with nitrate of iron :—smell rather bad ; lead paper browned after a short exposure ; no fumes with hydrochloric acid. Time kept 21 days. Quantity of gas collected 70 c. c. ; rate of evolution per week 23·3 c. c. The permanganate solution required 0·0075 cubic ft. of air to decolorise it.

Analysis of gas :

Carbonic acid - - -	62·37 per cent.
Sulphuretted hydrogen -	7·02 „
Nitrogen - - -	30·61 „
	100·00 „

Blood treated with chlorate of potash :—smell, bad ; lead paper browned after a short exposure ; no fumes with hydrocloric acid. Time kept 19 days. Quantity of gas collected 85 c. c. ; rate of evolution per week 31·3 c. c. Permanganate of potash solution required 0·0025 cubic ft. of air to decolorise it.

Analysis of gas :

Carbonic acid - - -	61·83 per cent.
Sulphuretted hydrogen -	1·77 „
Nitrogen - - -	36·40 „
	100·00

Blood treated with lime :—smell, very bad ; lead paper immediately browned ; no fumes with hydrochloric acid. Time kept 10 days. Quantity of gas collected 100 c. c. ; rate of evolution per week 70 c. c. The permanganate solution requires 0·0025 cubic ft. of air to decolorise it.

Analysis of gas :

Carbonic acid - - -	75·79 per cent.
Sulphuretted hydrogen -	5·10 „
Nitrogen - - -	19·11 „
	100·00

Blood treated with nitrate of lead :—smell, very bad ; lead paper immediately browned ; no fumes with hydrochloric acid. Time kept 11 days. Quantity of gas collected 80 c. c. ; rate of evolution per week 51 c. c. The permanganate solution required 0·0025 cubic ft. of air to decolorise it.

Analysis of gas :

Carbonic acid - - -	87·84 per cent.
Sulphuretted hydrogen -	4·72 „
Nitrogen - - -	7·44 „
	100·00

Blood treated with equal weights of cresylic acid and sulphite of soda :—had a smell of sulphuretted hydrogen ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 9 days. Quantity of gas collected 95 c. c. ; rate of evolution per week 73·5 c. c. The permanganate test solution required 0·0025 cubic ft. of air to decolorise it. In this and a few other cases the temperature of the water-bath rose 20° F. at least above the correct point, and so considerably affected the rate of evolution of the gas.

Analysis of gas :

Carbonic acid - -	57·85 per cent.
Sulphuretted hydrogen -	6.66 „
Nitrogen - - -	35·49 „
	100·00

Blood treated with common salt or chloride of sodium :—had a smell of sulphuretted hydrogen ; lead paper browned immediately ; no fumes with hydrochloric acid. Time kept 12 days. Quantity of gas collected 69 c. c. ; rate of evolution per week 40·25 c. c. The permanganate test solution required 0·0025 cubic ft. of air to decolorise it. This bottle was also subjected to an undue increase of temperature.

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Bottle 23. Common salt proportion of disinfectant

Analysis of gas :

Carbonic acid - -	85·21 per cent.
Sulphuretted hydrogen -	7·11 „
Nitrogen - - -	7·68 „
	100·00

Blood treated with $\frac{1}{500}$ its weight of McDougall's powder :—had a strong smell of sulphuretted hydrogen ; lead paper very strongly browned immediately. Time kept 8 days. Quantity of gas collected 65 c. c. ; rate of evolution per week 57 c. c. nearly. The permanganate test solution required 0·0025 cubic ft. of air to decolorise it.

Bottle 24. McDougall's powder: proportion of disinfectant $\frac{1}{500}$.

Analysis of the gas :

Carbonic acid - -	82·16 per cent.
Sulphuretted hydrogen -	10·40 „
Nitrogen - - -	7·44 „
	100·00

Blood treated with $\frac{1}{250}$ of its weight of McDougall's powder :—smelt strongly of sulphuretted hydrogen ; lead paper immediately browned very strongly. Time kept 8 days. Quantity of gas collected 65 c. c. ; rate of evolution per week nearly 57 c. c. The permanganate solution required 0·0025 cubic ft. of air to decolorise it. This bottle was subjected to the same rise of temperature mentioned before.

Bottle 25 McDougall's powder; proportion of disinfectant $\frac{1}{250}$.

Analysis of the gas :

Carbonic acid - -	76·66 per cent.
Sulphuretted hydrogen -	16·38 „
Nitrogen - - -	6·96 „
	100·00

Blood treated with $\frac{1}{250}$ of its weight of carbolic acid :—smell, bad ; lead paper immediately browned ; with hydrochloric acid no fumes. Time kept 8 days. Quantity of gas collected 69 c. c. ; rate of evolution per week 60·3 c. c. The permanganate test solution required 0·0025 cubic ft. of air to decolorise it. This bottle was subjected to the rise of temperature.

Bottle 26 Carbolic acid proportion of disinfectant

Analysis of the gas :

Carbonic acid - -	64·42 per cent.
Sulphuretted hydrogen	4·52 „
Nitrogen - - -	31·06 „
	100·00

Blood treated with iodide of potassium :—smell, rather bad ; lead paper browned ; no fumes with hydrochloric acid. Time kept 7 days. Quantity of gas collected, and rate of evolution per week, 78 c. c. The permanganate test solution required 0·005 cubic ft. of air to decolorise it.

Bottle 27. Iodide of potassium; proportion of disinfectant $\frac{1}{250}$.

Analysis of the gas :

Carbonic acid - -	42·97 per cent.
Sulphuretted hydrogen -	10·59 „
Nitrogen - - -	34·45 „
Hydrogen - - -	4·29 „
Marsh gas - - -	7·70 „
	100·00

Blood treated with cresylic acid and sulphite of soda :—smell, like that of cresylic acid, and slightly of sulphuretted hydrogen ; lead paper browned after three or four minutes exposure. Time kept 18 days. Quantity of gas collected 65 c. c. ; rate per week 25·2 c. c. ; no fumes with hydrochloric acid. The

Bottle 28. Cresylic acid sulphite of so $\frac{1}{250}$ of each.

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permanganate test solution required 0·005 cubic ft. of air to decolorise it.

Analysis of the gas :

Carbonic acid	-	71·02 per cent.
Sulphuretted hydrogen	-	10·00 „
Nitrogen	-	18·98 „
		100·00

mmon salt portion of nfectant $\frac{1}{100}$.

Blood treated with common salt kept 14 days, smelt of sulphuretted hydrogen Lead paper was browned after a short exposure. Quantity of gas given off 65 c. c., rate of evolution per week 32·5 c. c. The permanganate test required 0·0025 c. ft. of air to discolorise it. No fumes with H Cl. On distillation, 200 c. c. were taken, and 50 c. c. of the distillate required 7·5 c. c. of permanganate without acid and 13 c. c. after adding acid. A white precipitate with acetate of lead, and a splendid crimson colour was produced with nitric acid.

orate of ash. portion of nfectant $\frac{1}{100}$.

Blood treated with $\frac{1}{100}$ chlorate of potash. Smell, rather bad, but faint only, No fumes with hydrochloric acid. Lead paper moistened and exposed five minutes failed to show any trace of sulphuretted hydrogen 0·070 c. ft. of air faintly altered the tint of the permanganate solution. The gas given off was lost by the tubes becoming stopped up and the cork being forced out of the bottle by the pressure within. 200 c. c. were distilled, and 50 c. c. of the distillate required 0·3 c. c. of permanganate to give a pink tinge, with acid 1·5 c. c. No reaction with acetate of lead, a faint pink with nitric acid.

Picri Prop disin

Blood treated with picric acid, smell, when cold none, when warm like fresh blood. Lead paper moistened and exposed five minutes, showed no trace of sulphuretted hydrogen. No fumes with hydrochloric acid. Time kept 22 days. Quantity of gas evolved 10 c. c., rate per week 3·2 c. c. The permanganate solution was not the least affected by 0·150 c. ft. of air. Not sufficient gas for analysis. 200 c. c. being distilled gave a distillate, 50 c. c. of which required ·8 c. c. of permanganate, and with acid 4 c. c. to colour it. No reaction with acetate of lead, a straw colour with nitric acid.

Cresy Prop disin

Blood treated with cresylic acid smelt slightly of that disinfectant. Time kept 22 days. No fumes with hydrochloric acid; no reaction with lead paper exposed 5 minutes moist. The permanganate test required ·275 c. ft. of air to decolorise it. Quantity of gas evolved 12 c. c., rate per week 3·8 c. c. The distillation process is not applicable here.

—	Substances with which the Blood was treated, and Quantity in proportion to the Weight of the Blood.	Smell after keeping.	Action of Gas evolved on Lead Paper.	Reaction of Gas with Hydrochloric Acid.	Time kept at a Temperature of from 80° to 86° F.	Quantity of Gas collected.	Rate of Evolution per Week.	Quantity of Air passed through the Blood, and afterwards Permanganate of Potash, required to decolorise the Permanganate Solution, in terms of a Cubic Foot.
						Cub. Cts.	Cub. Cts.	
1	Blood and water -	Exceedingly bad	Strongly browned directly.	None -	12 days -	65	38	0·0025
2	Carbolic acid $\frac{1}{1000}$ - -	Bad - -	Browned it after a short exposure.	None -	17 „ -	65	26·76	0·003
3	Carbolic acid $\frac{1}{10000}$	Very bad -	Browned it directly -	None -	——	—	—	0·0025
4	Cresylic acid $\frac{1}{1000}$ - -	Bad - -	Browned it directly -	None -	17 days -	68	28	0·0025
5	Chloride of lime $\frac{1}{1000}$ -	Very bad -	Browned it directly -	None -	15 „ -	65	30·33	0·005
6	Chloride of lime, with an equivalent of sulphuric acid. $\frac{1}{1000}$	Very bad -	Strongly browned it directly.	None -	12 „ -	65	37·9	0·0025
7	Chloride of zinc $\frac{1}{1000}$ - -	As good as that of fresh blood.	The paper being moistened and exposed five minutes, it was not the least affected.	None -	22 „ -	4·5	1·43	0·15 cubic ft. had no effect on the colour.
8	Perchloride of iron $\frac{1}{1000}$ -	Like fresh blood	No action on lead paper	None -	7 „ -	70	70	0·225 had no effect on the colour.
9	Common salt $\frac{1}{1000}$ - -	Rather bad -	Browned it, but not much.	None -	18 „ -	65	25·27	Not tried.
10	Sulphite of soda $\frac{1}{1000}$ -	Bad - -	Browned immediately -	None -	10 „ -	85	59·5	0·0025
11	Sulphite of soda, and an equivalent of sulphuric acid. $\frac{1}{1000}$	——	——	——	——	—	—	—
12	Arsenious acid $\frac{1}{1000}$ - -	Slightly disagreeable.	Moistened lead paper, after 5 minutes exposure, was faintly browned at the edges.	None -	20 „ -	4·7	1·64	0·015
13	McDougall's powder $\frac{1}{1000}$ -	Very bad -	Browned it directly -	None -	6 „ -	90	105	0·0025
14	Corrosive sublimate $\frac{1}{1000}$ -	Almost as good as that of fresh blood.	Paper moistened, and exposed 5 minutes, not affected the least.	None -	20 „ -	13	4·5	0·0035
15	Sulphate of copper $\frac{1}{1000}$ -	Faint smell of H S.	After 5 minutes exposure, faintly browned at the edges.	None -	20 „ -	9	3·15	0·006
16	Sulphate of alumina $\frac{1}{1000}$ -	Bad - -	Browned directly -	None -	24 „ -	80	23·3	0·0025
17	Sulphate of iro $\frac{1}{1000}$ -	Bad - -	Browned directly -	None -	21 „ -	70	23·3	0·0025
18	Nitrate of iron $\frac{1}{1000}$ -	Rather bad -	Browned after a short exposure.	None -	21 „ -	70	23·3	0·0075
19	Chlorate of potash $\frac{1}{1000}$ -	Bad - -	Browned after a short exposure.	None -	19 „ -	85	31·3	0·0025
20	Lime $\frac{1}{1000}$ - - -	Very bad -	Browned it directly -	None -	10 „ -	100	70	0·0025
21	Nitrate of lead $\frac{1}{1000}$ - -	Very bad -	Browned it directly -	None -	11 „ -	80	15	0·0025
22	Cresylic acid and sulphite of soda mixture. $\frac{1}{800}$	Bad - -	Browned it directly -	None -	9 „ -	95	73·5	0·0025

—	Substances with which the Blood was treated, and Quantity in proportion to the Weight of the Blood.	Smell after keeping.	Action of Gas evolved on Lead Paper.	Reaction of Gas with Hydrochloric Acid.	Time kept at a Temperature of from 80° to 86° F.	Quantity of Gas collected.	Rate of Evolution per Week.	Quantity of Air passed through the Blood, and afterwards Permanganate of Potash, required to decolorise the Permanganate Solution, in terms of a Cubic Foot.
						Cub. Cts.	Cub. Cts.	
23	$\frac{1}{200}$ Common salt	Smell of H S.	Browned it directly	None	12 days	69	37·7	0·0025
24	$\frac{1}{200}$ McDougall's powder	Strong smell of H S.	Browned very strongly directly.	None	8 „	65	57	0·0025
25	$\frac{1}{200}$ McDougall's powder	Strong smell of H S.	Very strongly browned directly.	None	8 „	65	57	0·0025
26	$\frac{1}{200}$ Carbolic acid, or phenic alkohol.	Bad	Browned immediately	None	8 „	69	69	0·0025
27	$\frac{1}{200}$ Iodide of potassium	Rather bad	Lead paper browned	None	7 „	78	78	·005
28	Cresylic acid and sulphite of soda.	H.S. a little	Lead paper browned	—	18 „	65	25·2	0·005

It will be seen by comparing the results shown in the table, that arsenious acid, corrosive sublimate, sulphate of copper, and chloride of zinc are the most active agents. To compare these with each other, the blood treated with them was in each case distilled, 200 c. c. being the quantity taken for the purpose, and 50 c. c. allowed to come over. One half the distillate was treated with permanganate of potash till a permanent red tinge was communicated to the liquid, and the amount required in each case to produce this was considered to be an estimate of the relative quantity of organic matter in the distilled portion, or, in other words, the quantity of volatile organic matter in the blood. The other half of the distillate was treated with acetate of lead, to ascertain the amount of sulphuretted hydrogen, if any, present. For the sake of comparison with the other experiments, fresh blood warm from the animal, and blood kept 48 hours, were subjected to the same treatment, also decidedly putrid blood which had been treated with lime.

It will be noticed that these distillations give no account of the sulphuretted hydrogen present; for blood smelling extremely bad after being kept 11 days with $\frac{1}{1000}$ of lime, and giving unmistakeable evidence of much sulphuretted hydrogen both to the nose and lead paper, yielded only a slight quantity in the distillation, not so much, in fact, as blood kept only 48 hours, and not smelling disagreeable at all. During the distillation, however, the blood treated with lime smelt extremely bad. On adding to the distillates a drop or two of nitric acid, and heating, a fine red colour was the result; the residue of the distillation gave it also, but not so deeply. On treating with ether the residue after distillation of the blood treated with lime, the ether being separated and evaporated on a watch glass, the peculiar fatty smell which was noticed in the distilled liquids and residues accompanied an oil. On adding a drop of nitric acid, and applying heat, the red colour was produced with much intensity. Some of the blood kept 48 hours was shaken with ether, but the liquid left on evaporation possessed no smell, and yielded no colour with nitric acid.

In order more completely to compare the beforementioned disinfectants, other data are given in the following table, additional to those in the preceding one. In these experiments, chloride of zinc is the most efficacious of the substances tried in one respect, and in another corrosive sublimate, then come arsenious acid and sulphate of copper; but the chloride of zinc far surpasses the others, as tried by the air test in conjunction with permanganate of potash. The phenylic and cresylic alcohols, which experience has shown to be generally so active in the prevention of putrefaction, are not sufficiently constant when a large quantity of water is present. It may be remarked that the permanganate and air test is very severe, but, notwithstanding, the blood treated by chloride of zinc failed to affect the colour, which was indeed very delicate in tint. The peculiar oil which gives the red colour with nitric acid was, however, found in the blood treated with chloride of zinc. The absence of this is very difficult to attain. It will be seen, afterwards, that it was attained by means of chloride of iron, which must, of other metals, contest with chloride of zinc.

After Distillation.			State of the Blood before Distillation.			
—	Quantity of permanganate of potash solution required to give a pink tinge to 25 c. c. of the distilled blood.	Reaction with acetate of lead.	Smell.	Action of gas evolved on lead paper.	Time kept.	Quantity of air required to decolorise the permanganate test solution after being passed through the blood.
Fresh blood warm from the animal.	0·0 c. c.	Slight black precipitate.	—	—	—	—
Blood kept 48 hours	2·2 c. c.	Slight black precipitate.			48 hours.	—
Blood treated with arsenious acid. $\frac{1}{1000}$	3·2 c. c.	Slight black precipitate.	Very slightly disagreeable.	Moistened lead paper, after being exposed five minutes, faintly browned at the edges.	20 days	Cub. ft. 0·015
Corrosive sublimate $\frac{1}{1000}$	0·2 c. c.	White precipitate not carbonate, soluble in acetic acid.	Almost as good as that of fresh blood.	Moistened lead paper not affected at all after five minutes exposure.	20 „	0·035
Sulphate of copper $\frac{1}{1000}$	6·0 c. c. Total amount after acidifying 8·2 c. c.	Slight black precipitate, with a white one; acetic acid dissolved the white.	Slightly of sulphuretted hydrogen.	Paper moistened and exposed five minutes faintly tinged at the edges.	20 „	0·006
Chloride of zinc $\frac{1}{1000}$	0·4 c. c. Total amount after acidifying 0·6 c. c.	Whity-brown precipitate; acetic acid dissolved the white, and left a brownish liquid.	As good as that of fresh blood.	Paper moistened and exposed five minutes not at all affected.	22 „	0·15 c. ft. had not the faintest effect on the colour.
Lime $\frac{1}{1000}$	12·3 c. c. Total amount after acidifying 15·2 c. c.	Whity-brown precipitate; acetic acid dissolved the white, and left a turbid brown liquid.	Very bad	Browned lead paper immediately.	10 „	Cub. ft. 0·0025

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Gases evolved with various Disinfectants acting in Water.

	CO_2	H S	N	H	$C_2 H_4$	Quantity of Gas collected.	Rate per Week.
Blood, alone	86·72	13·28	- -	- -	- -	35 days, 260 cubic cent.	52 cubic cent
Blood, alone	69·00	6·68	24·32	- -	- -	12 „ 65 „	38 „
Blood, disinfected by McDougall's powder $\frac{1}{1000}$	70·56	4·74	24·70	- -	- -	6 „ 90 „	105 „
„ „ McDougall's powder $\frac{1}{500}$	82·16	10·40	7·44	- -	- -	8 „ 65 „	57 „
„ „ McDougall's powder $\frac{1}{250}$	76·66	16·38	6·96	- -	- -	8 „ 65 „	57 „
„ „ Common salt $\frac{1}{10000}$, 1st portion	84·26	4·62	11·12	- -	- -	18 „ 65 „	25·2 „
„ „ „ 2d portion	94·93	2·53	2·64	- -	- -	26 „ 130 „	34·3 „
„ „ „ 3d portion	81·07	1·92	17·01	- -	- -	49 „ — „	—
„ „ carbolic acid $\frac{1}{10000}$	29·02	7·31	63·67	- -	- -	24 „ 65 „	18·96 „
„ „ „ $\frac{1}{1000}$	69·89	6·80	23·31	- -	- -	17 „ 65 „	26·7 „
„ „ „ $\frac{1}{250}$	64·42	4·52	31·06	- -	- -	*8 „ 69 „	60·3 „
„ „ cresylic acid and sulphite of soda $\frac{1}{1000}$.	57·85	6·66	35·49	- -	- -	*9 „ 95 „	73·5 „
„ „ cresylic acid and sulphite of soda $\frac{1}{200}$.	71·02	10·00	18·98	- -	- -	18 „ 65 „	25·2 „
„ „ chloride of lime and sulphuric acid $\frac{1}{1000}$	45·22	4·64	49·74	- -	- -	12 „ 65 „	37·9 „
„ „ chloride of lime $\frac{1}{1000}$	78·61	4·20	17·19	- -	- -	15 „ 65 „	30·3 „
„ „ cresylic acid $\frac{1}{1000}$	66·99	3·96	29·05	- -	- -	17 „ 68 „	28·0 „
„ „ chloride of iron $\frac{1}{1000}$	17·64		82·36	- -	- -	—	70 „
„ „ sulphite of soda $\frac{1}{1000}$	82·72	4·30	12·98	- -	- -	10 „ 85 „	59·5 „
„ „ nitrate of lead $\frac{1}{1000}$	87·84	4·72	7·44	- -	- -	11 „ 80 „	51 „
„ „ lime $\frac{1}{1000}$	75·79	5·10	19·11	- -	- -	10 „ 100 „	70 „
„ „ chlorate of potash $\frac{1}{1000}$	61·83	1·77	36·40	- -	- -	19 „ 85 „	31·3 „
„ „ common salt $\frac{1}{10}$	85·21	7·11	7·68	- -	- -	*12 „ 69 „	40·25 „
„ „ nitrate of iron $\frac{1}{1000}$	62·37	7·02	30·61	- -	- -	21 „ 70 „	23·3 „
„ „ sulphate of iron $\frac{1}{1000}$	89·53	10·47	- -	- -	- -	21 „ 70 „	23·3 „
„ „ sulphate of alumina $\frac{1}{1000}$	39·58	9·63	50·79	- -	- -	24 „ 80 „	23·3 „
„ „ iodide of potassium $\frac{1}{1000}$	42·97	10·59	34·45	4·29	7·70	7 „ 78 „	78 „
„ „ sulphite of soda and carbolic acid.	78·00	10·32	11·68	- -	- -	18 „ 69 „	1·8 „
„ „ chloride of iron $\frac{1}{1000}$	85·36	9·94	4·70	- -	- -	42 „ 325 „	5·4 „
„ „ phenyl alkohol $\frac{1}{200}$	51·17	4·26	44·57	- -	- -	21 „ 69 „	23 „
Blood treated with $\frac{1}{1000}$ chloride of zinc	Not sufficient evolved for analysis					22 „ 4·5 „	1·4 „
„ „ arsenious acid	„	„	„			20 „ 4·7 „	1·6 „
„ „ bichloride of mercury	„	„	„			20 „ 13 „	4·5 „
„ „ sulphate of copper	„	„	„			20 „ 9 „	3·1 „

*The bottles marked thus were by accident subjected to an increase of temperature to the extent of 20° F. or more, thus causing an acceleration in the rate of evolution. The hydrogen and hydrocarbons were too small in amount to be estimated and stand as nitrogen.

It seems well to avoid in all cases the use of much liquid. When liquids are used in great quantities, disinfection becomes difficult. Blood, as it flows from the animal, is preserved untainted by a small amount of phenic acid; if diluted with water, a very large amount is wanted, continually requiring renewal. This is an objection to all very deliquescent substances, but when water cannot be avoided, the last four in the above table are clearly the best. It is, on the other hand, a point greatly in favour of all solid disinfectants which absorb water. It is in favour of charcoal, although, as already stated, there are other points against it, not forgeting its colour. It is in favour of lime, and it is also strongly in favour of a disinfecting powder, when it is used in dry places where there is no more water than it can readily absorb. For the same reason, such washing as will leave a place for some time damp is to be avoided when it is desired to disinfect.

IV.

Disinfection of Sewage.

	Amount of chameleon solution required for oxidation, per 1,000 parts of water.
Water of a sewage river -	13
After alum - -	3
After alum and lime water	3
After lime alone - -	6
After perchloride of iron -	10
After perchloride of iron and lime water - -	1

This water may be purified in an instant from nearly all its organic and certainly from all its putrid matter by the use of metallic and lime salts. That treated became clear and bright. The same water did not in a fortnight become moderately clear by standing alone. At the same time, however, oxidation took place so rapidly that the organic matter was reduced from nine to five, and the ammonia disappeared entirely. In exposed water especially when not very cold organic matter will not exist. The water is constantly absorbing oxygen, and it acts like an infinitely divided and porous body. Every particle, perhaps every atom, of organic matter, is exposed to air, and purification goes on at a rapid pace. The amount of solid matter destroyed by water in this way is very great. This constitutes one of the great dangers of water into which organic matter is flowing, whether that water be stagnant or in motion. Stagnant water has, however, more chance to have organic matter in it, and is more frequently dangerous; besides, the putrefaction it undergoes is less wholesome, because being less turned over it is less supplied with air. If a crust is formed on the surface, the supply of air is still more diminished. The more the supply of water in proportion to the organic matter the purer are the gases evolved. But unless the supply of water is excessive, it is better to have none at all, as the decomposition is checked, or entirely prevented, according to the dryness. The golden mean is not found in what is usually called a moderate supply of water.

V.

The third method was an attempt to find how much of some of the most important substances was necessary to remove putrefaction already formed, a few minutes only being allowed for the operation.

On the Removal of Smells, and the relative Values of different Disinfectants for that Purpose.

A bottle of blood freed from clot and diluted with twice its volume of water, which had been treated with $\frac{1}{1000}$ its weight of sulphite of soda, having become putrid, was considered suitable for the purpose. Five bottles, which constituted the first series, containing each 100 c. c. of this matter, were treated with perchloride of iron, chloride of zinc, McDougall's powder, cresylic and phenylic alcohol. The second series contained chloride of zinc, common salt, perchloride of iron, McDougall's powder, cresylic alcohol, and chloride of lime. The disinfectant was in each case added until the disagreeable smell was removed; the liquid was then distilled, and the quantity of permanganate of potash requisite to colour the distillate pink, was taken as the relative quantity of organic matter present. In the liquid distilled from the cresylic and phenylic alcohols this test is not of any value, because the quantity of these substances which distil over themselves decolorise the permanganate; this is also the case with McDougall's powder. The accompanying table shows the results obtained, though in truth they are of themselves not worth

much; this much, however, was determined by them, that cresylic alcohol is more powerful than the phenylic, and a mixture of it with sulphite of soda better than either substance by itself. Large quantities of perchloride of iron, and the chlorides of zinc and sodium, failed to remove all smell, though the smell remaining was not that of putrid matter. A third series of experiments, considered an improvement on those just described, was carried out: 10 grammes each of the following substances were added to 100 c. c. of a putrid mixture of blood and two parts water; the mixture was then distilled, and the distillate was tested with permanganate of potash, as in the former case, and acetate of lead.

FIRST SERIES OF EXPERIMENTS.

Disinfectants used.	Quantity required to take away the smell.	Quantity of permanganate of potash required to give a pink tinge.		Reaction with Acetate of Lead.	Smell of the Distillate.
		Without acid.	With acid.		
	Grammes.				
Cresylic alcohol or acid	3	50	190	No colour	Like fresh blood.
Phenylic alcohol	5	270	—	No colour	Faint fatty smell mixed with that of phenylic alcohol.
Perchloride of iron	12·25	5	5	No colour	Like acroleine.
Chloride of zinc	15	15	55	Faint shade of brown.	Fatty smell.
McDougall's powder	10	60	430	No colour	Faint fainty smell.

SECOND SERIES.

	Grammes.				
Cresylic acid	3	110	—	No brown colour	Faint smell of animal oil.
Chloride of lime	7·5	40	50	No brown colour	Smell like burnt horn.
Perchloride of iron	12·25	5	5	No brown colour	Smell like cow dung.
McDougall's powder	10	85	90	No brown colour	Smell like sewage.
Chloride of zinc	40	120	120	Faintly brown	Very bad smell.
Common salt	32	130	160	Faintly brown	Very bad smell.
Cresylic alcohol and sulphite of soda.	2 of the cresylic alcoholic; about 10 grammes of sulphite of soda.	100	125	No colour	Fatty smell only.

THIRD SERIES OF EXPERIMENTS.

Disinfectants used, in the proportion of 10 grammes to 100 cubic centimetres of putrid matter.	Quantity of permanganate required.		Re-action with acetate of lead.	Re-action with nitric acid.	Smell of the distillate.
	Without acid.	With acid.			
	Cubic cents.	Cubic cents.			
Perchloride of iron	0·5	1·0	None	Straw colour	Bad.
Chloride of lime	6·2	7·5	None	Straw colour	Pungent smell from a peculiar compound formed from the chloride of lime and ammonia, putridity gone.
McDougall's powder*	—	17·5	None	Bright rose colour	Bad.
Common salt	21·0	24·5	Light brown	Dull rose colour	Bad.
Chloride of zinc	27·5	28·4	None	Dark rose colour, quickly fading.	Disgusting.

* The McDougall's powder gave a distillate so very alkaline from ammonia set free that acid was added at once, otherwise the permanganate could not have been tried.

Permanganate of potash, Condy's fluid, completely removes the smell at once.

Peroxide of hydrogen removes all the unpleasant smell, and adds a very agreeable scent.

From these experiments it is clear that even the most powerful antiseptics are far from being well fitted for removing putrid smells, when added in a strong state. Acids and acid metallic salts, such as chlorides of zinc and iron, send out a very disagreeable fatty acid, which seems to be the same that comes over with ammonia when the putrid matter is distilled. For this reason chemicals such as these ought never to be poured on strong or slightly diluted putrid matter, in order to produce an immediate effect. They do, however, produce an effect afterwards.

Cresylic and phenylic alcohols have no such violent effect in sending out fumes, and here they stand best, except the mixture with sulphite of soda and chlorine, which destroys. It is 16 years since I first tried a mixture of sulphite of soda and carbolic acid, and found that with one only complete disinfection could not be obtained. Mr. Daniel Stone informed me that he used the two mixed as antiseptics before that time. Along with Mr. McDougall, the experiments were continued, and the result was, McDougall's disinfecting powder, which still holds its ground, with a combination of qualities not possessed by any other substance, if he added more carbolic acid (or carbolate of lime). It is easy to surpass it in any one of its qualities separately by some substance, but to surpass it in all would then, that is if more carbolic acid were in it, require the combined action of several substances, always supposing much water not to be present. On account of this small amount of carbolic acid, it is not put in the list of

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substances for fumigation and prevention of cattle disease. Its most fitting use is for preventing decomposition in manures.

Chloride of iron tells here much better than chloride of zinc. I think this must depend on the state of saturation.

Chloride of lime acted better than any of the salts here given. It has many excellent qualities; it never gives out a foul smell under any circumstances, and may be used either on solid or watery impurities. The peculiar pungent smell spoken of as given out by it comes from the destruction of the ammonia. This salt is elsewhere spoken of. Common salt has little power in removing putrid matter; its influence is colytic only.

Of these substances I would of course prefer peroxide of hydrogen, if it were not out of the question as regards price, next permanganate of potash, for removing the smell; but it would be needful afterwards to add another agent to keep the putrefaction from returning.

In cowhouses, and even in families, these last two substances are expensive, and in the first not even to be thought of. What would we choose next? To remove a smell rapidly, chloride of lime is decidedly the most ready. People cannot well have every disinfectant at their disposal; and are they to use perchloride of iron only, which here comes out so well? If the prevention of decomposition were all that was wanted, this might be done, although it is by no means pleasant to cover the floor of cowhouses with liquids when they are already too wet; but the fact that the iron salt is not volatile, and does not act on the air, is a decided objection to its sole use.

By the mixture of sulphites and tar acids we obviate this objection, but we, again, are subject to the formation of sulphuretted hydrogen if we allow the presence of much water.

We see then that it is a very complicated problem. Disinfection is not a magic act performed by a small piece of some substance which removes all evils at once. There are many evils in various conditions, and each must be attacked in its own peculiar mode.

VI.

EXPERIMENTS to determine the Amount of each of the following Substances necessary to prevent the evolution of Sulphuretted Hydrogen.

Substances.—Arranged in Groups.

Acids and Alcohols.	Mixtures, &c.	Salts.
Carbolic.	Lime.	Alum.
Cresylic.	McDougall's powder.	Bichromate of potash.
Hydrochloric.	Sulphite of soda and nitric acid.	Chloride of aluminium.
Nitric.	Heavy oil of tar; soda solution.	Chloride of lime.
Sulphuric.	Heavy oil of tar; water solution.	Sulphite of soda.

These experiments were made on a mixture of equal parts of nearly fresh blood and water. 400 c. c. were put into a bottle capable of containing about 1,000 c. c., or about 14 ounces, were put into wide-mouthed bottles which could hold about 36.

Three experiments were tried with each, using 1 per cent., 2½ per cent., and 5 per cent. of the disinfectant. Each bottle, properly labelled, was kept four days at a temperature varying from 50° to 60° F. (10° to 15·5 centigrade), after which it was kept in a water bath which ranged from 80° to 86° F. (26·6° to 30° centigrade). The contents were examined daily.

SECOND DAY.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	From 50 to 60	Slight odour of blood	None.
	0·025		Do. do.	Do.
	0·05		Very faint odour	Do.
Cresylic acid	0·01	Between 50 and 60.	Slight odour of blood	Do.
	0·025		Very faint odour	Do.
	0·05		Do. do.	Do.
Hydrochloric acid (Sp. gr. 1·03.)	0·01	Between 50 and 60.	Odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
Nitric acid (Sp. gr. 1·08.)	0·01	Between 50 and 60.	Slight odour of blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
Sulphuric acid (Sp. gr. 1·17.)	0·01	Between 50 and 60.	Odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
McDougall's powder	0·01	Between 50 and 60.	Strong odour of stale blood	Do.
	0·025		Slight odour of stale blood	Do.
	0·05		Odour of stale blood	Do.
Heavy oil of tar (Soda solution.)	0·01	Between 50 and 60.	Slight odour of blood and tar	Do.
	0·025		Odour of blood and tar	Do.
	0·05		Do. do.	Do.
Heavy oil of tar (Water solution.)	0·01	Between 50 and 60.	Odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
Sulphate of alumina and ammonia (Alum.)	0·01	Between 50 and 60.	Slight odour of blood	Do.
	0·025		Very slight odour of blood	Do.
	0·05		Do. do.	Do.
Bichromate of potash	0·01	Between 50 and 60.	Sour odour	Do.
	0·025		Do.	Do.
	0·05		Odour of fermenting sugar	Do.

Substance used.	Quantity.	Temperature.	Odour.	H S.
Chloride of aluminum	0·01	Between 50 and 60.	Slight odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
Chloride of lime	0·01	Between 50 and 60.	Slight odour of stale blood	Do.
	0·025		Slight odour	Do.
	0·05		Very faint odour	Do.
Sulphite of soda	0·01	Between 50 and 60.	Slight odour	Do.
	0·025		Do.	Do.
	0·05		Do.	Do.

H S. on last column means sulphuretted hydrogen.

Fourth Day.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 50 and 60.	Slight odour of stale blood	None.
	0·025		Do. do.	Do.
	0·05		Very faint odour of stale blood	Do.
Cresylic acid	0·01	Between 50 and 60.	Slight odour of stale blood	Do.
	0·025		Slight odour	Do.
	0·05		Do.	Do.
Hydrochloric acid (Sp. gr. 1·03.)	0·01	Between 80 and 86.	Slight odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.
Nitric acid (Sp. gr. 1·08.)	0·01	Between 50 and 60.	Rather putrescent odour	Do.
	0·025		Slight putrescent odour	Do.
	0·05		Odour of stale blood	Do.
Sulphuric acid (Sp. gr. 1 17)	0·01	Between 80 and 86.	Farm-yard manure	Large.
	0·025		Warm blood manure	Little.
	0·05		Warm stale blood odour	Large.
McDougall's powder	0·01	Between 50 and 60.	Slight odour of stale blood	None.
	0·025		Very slight odour of stale blood	Do.
	0·05		No odour but that of the blood	Do.
Heavy oil of tar (Soda solution.)	0·01	Between 50 and 60.	Slight odour of stale blood and tar	Do.
	0·025		Faint odour of tar	Do.
	0·05		Do.	Do.
Heavy oil of tar (Water solution.)	0·01	Between 50 and 60.	Slight putrescent odour and tar	Do.
	0.025		Slight putrescent tar odour	Do.
	0·05		Do. do.	Do.
	0·01		Sour blood and tar odour	Do.
	0·025		Do. do.	Do.
	0·05		Slight odour mixed with tar	Do.
Sulphate of alumina and ammonia (Alum.)	0·01	Between 50 and 60.	Putrescent odour	Do.
	0·025		Slight putrescent odour	Do.
	0·05		Very slight putrescent odour	Do.
Bichromate of potash	0·01	Between 50 and 60.	Putrescent odour	Do.
	0·025		Do.	Do.
	0·05		Do.	Do.
Chloride of aluminum	0·01	Between 50 and 60.	Odour of stale blood	Do.
	0·025		Do.	Do.
	0·05		Slight odour	Do.
Chloride of lime	0·01	Between 50 and 60.	Very slight odour of blood	Do.
	0·025		Do. do.	Do.
	0·05		Very slight odour	Do.
Sulphite of soda	0·01	Between 50 and 60.	Slight odour of blood	Do.
	0·025		Do. do.	Do.
	0·05		Do. do.	Do.

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Fifth Day.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 80 and 86.	Warm slightly putrescent blood	None.
	0·025		Do. do.	Do.
	0·05		Acetaceous odour	Do.
Cresylic acid	0·01	Between 80 and 86.	Warm stale blood odour	Do.
	0·025		Odour of cresylic acid	Do.
	0·05		Do. do.	Do.
Hydrochloric acid (Sp. gr. 1·03.)	0·01	Between 80 and 86.	Warm slight putrescent odour	Do.
	0·025		Warm stale blood odour	Do.
	0·05		Putrescent odour	Do.
Nitric acid (Sp. gr. 1·08.)	0·01	Between 80 and 86.	Slight sour odour	Do.
	0·025		Faint odour of warm blood	Do.
	0·05		Do. do.	Do.
Sulphuric acid (Sp. gr. 1·17.)	0·01	Between 80 and 86.		
	0·025			
	0·05			
McDougall's powder	0·01	Between 80 and 86.	Odour of warm stale blood	Do.
	0·025		Odour of warm blood and carbolic acid	Do.
	0·05		Odour of a little carbolic acid	Do.
Heavy oil of tar (Soda solution.)	0·01	Between 30 and 86.	Faintly putrescent	Do.
	0·025		Tar odour	Do.
	0·05		Do.	Do.
Heavy oil of tar (Water solution).	0·01	Between 80 and 86.	Putrescent	Trace.
	0·025		Strong odour of warm stale blood	None.
	0·05		Do. do.	Do.
	0·01	Between 50 and 60.	Tar, and slight colour of warm blood	Do.
	0·025		Tar odour	Do.
	0·05		Do.	Do.
Sulphate of alumina and ammonia	0·01	Between 80 and 86.	Strong odour of stale warm blood	Do.
	0·025		Do. do.	Do.
	0·05		Very faint odour of warm blood	Do.
Bichromate of potash	0·01	Between 50 and 60.	Putrescent odour	Do.
	0·025		Do.	Do.
	0·05		Do.	Do.
Chloride of aluminum	0·01	Between 80 and 86.	Odour of warm stale blood	Do.
	0·025		Slight odour of warm stale blood	Do.
	0·05		Do. do.	Do.
Chloride of lime	0·01	Between 80 and 86.	Strong odour of stale blood	Do.
	0·025		Do. do.	Do.
	0·05		Very slight odour	Do.
Sulphate of soda	0·01	Between 80 and 86.	Strong odour of stale blood	Do.
	0·025		Slight odour of stale blood	Do.
	0·05		Faint odour of stale blood	Do.

Sixth Day.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 80 and 86.	Warm blood slightly putrescent	None.
	0·025		Do. do.	Do.
	0·05		Vinegar odour	Do.
Cresylic acid	0·01	Between 80 and 86.	Odour of warm stale blood	Do.
	0·025		Odour of cresylic acid	Do.
	0·05		Do. do.	Do.
Hydrochloric acid (Sp. gr. 1·03.)	0·01			
	0·025			
	0·05			
Nitric acid (Sp. gr. 1·08.)	0·01	Between 80 and 86.	Strong odour of hops	Faint trace.
	0·025		Same odour, but in a less degree	None.
	0·05		No odour but heat of blood	Do.
Sulphuric acid (Sp. gr. 1·17.)	0·01			
	0·025			
	0·05			
McDougall's powder	0·01	Between 80 and 86.	Acid putrescent odour	Large quantity.
	0·025		Same odour; not so bad	Trace.
	0·05		Slight putrescent odour	None.
Heavy oil of tar (Soda solution.)	0·01	Between 80 and 86.	Slight putrescent odour	Do.
	0·025		Peculiar sharp acid odour	Do.
	0·05		Tar odour	Do.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Heavy oil of tar (Water solution.)	0·01	Between 80 and 86.	Peculiar acid putrescent odour	Distinct evidence.
	0·025		Faint acid, sewage odour	Trace.
	0·05		Putrescent odour	None.
	0·1	Between 50 and 60.	Very faint putrescent odour	Do.
	0·25		Do. do.	Do.
	0·5		Tar odour	Do.
Sulphate of alumina and ammonia (Alum.)	0·01	Between 80 and 86.	Putrescent odour	Considerable.
	0·025		Acid putrescent odour	Distinct.
	0·05		Very faint putrescent odour	None.
Bichromate of potash	0·01	Between 80 and 86.	Garlic odour	Do.
	0·025		Acid putrescent odour	Do.
	0·05		Odour of musty cheese	Do.
Chloride of aluminum	0·01	Between 80 and 86.	Putrescent odour	Distinct.
	0·025		Putrescent acid odour	Very large.
	0·05		Faint putrescent odour	Small quantity.
Chloride of lime	0·01	Between 80 and 86.	Putrescent odour	Distinct
	0·025		Very slight putrescent odour	Trace.
	0·05		Acid odour	None.
Sulphite of soda	0·01	Between 80 and 86.	Slight putrescent odour	Do.
	0·025		Do. do.	Do.
	0·05		Very faint putrescent odour	Do.

Seventh Day.

Substances used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 80 and 86.	Warm stale blood	None.
	0·025		Do. do.	Little.
	0·05		Sour odour, and carbolic acid	Very distinct.
Cresylic acid	0·01	Between 80 and 86.	Warm stale blood	None.
	0·025		Odour of cresylic acid	Do.
	0·05		Do. do.	A little.
Hydrochloric acid (Sp. gr. 1·03.)	0·01			
	0·025			
	0·05			
Nitric acid (Sp. gr. 1·08.)	0·01	Between 80 and 86.	Odour of hops	None.
	0·025		Acid, slight putrescent odour	Do.
	0·05		Faint putrescent odour	Do.
Sulphuric acid (Sp. gr. 1·17.)	0·01			
	0·025			
	0·05			
McDougall's powder	0·01	Between 80 and 86.	Putrescent acid odour	Large.
	0·025		Faint putrescent acid odour	None.
	0·05			
Heavy oil of tar (Soda solution.)	0·01	Between 80 and 86.	Slight putrescent odour	None.
	0·025		Tar odour	Do.
	0·05		Do.	Distinct.
Heavy oil of tar (Water solution.)	0·01	Between 80 and 86.	Putrescent odour	Trace.
	0·025		Odour of warm stale blood	None.
	0·05		Odour of tar	Do.
	0·01		Do.	Do.
	0·025		Do.	Do.
	0·05			
Sulphate of alumina and ammonia (Alum.)	0·01	Between 80 and 86.	Warm stale blood	Small Quantity.
	0·025			
	0·05			
Bichromate of potash	0·01	Between 80 and 86.	Strong garlic odour	None.
	0·025		Strong sour odour	Do.
	0·05		Strong odour	Do.
Chloride of aluminum	0·01	Between 80 and 86.	Faint putrescent odour	Trace.
	0·025			
	0·05			
Chloride of lime	0·01	Between 80 and 86.	Warm stale blood odour	None.
	0·025		Putrescent odour	Trace.
	0·05			
Sulphite of soda	0·01	Between 80 and 86.	Warm stale blood	None.
	0·025		Do. do.	Do.
	0·05		Very little odour	Do.

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Eighth Day.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 80 and 86.	Odour of warm stale blood	Trace.
	0·025		Do. do.	Distinct.
	0·05		Sour odour and carbolic acid	Large.
Cresylic acid	0·01	Between 80 and 86.	Odour of warm stale blood	Distinct.
	0·025		Odour of cresylic acid	None.
	0·05		Do. do.	Large.
Hydrochloric acid (Sp. gr. 1·03.)	0·01	Between 80 and 86.	Sulphuretted hydrogen	Large.
	0·025		Disgusting odour	Do.
	0·05		Musty sulphuretted hydrogen odour	Do.
Nitric acid (Sp. gr. 1·08.)	0·01	Between 80 and 86.	Odour of hops	None.
	0·025		Sour peculiar odour	Do.
	0·05		Spicy odour	Do.
Sulphuric acid (Sp. gr. 1·17.)	0·01	Between 80 and 86.	Sulphuretted hydrogen odour	Very large
	0·025		Spicy sulphuretted hydrogen odour	Large.
	0·05		Putrescent sulphuretted odour	Do.
McDougall's powder	0·01	Between 80 and 86.	———	—
	0·025		———	—
	0·05		Decayed turnips	Distinct.
Heavy oil of tar (Soda solution.)	0·01	Between 80 and 86.	Slight putrescent odour	Trace.
	0·025		A sour tar odour	Do.
	0·05		———	—
Heavy oil of tar (Water solution.)	0·01	Between 80 and 86.	———	—
	0·025		Putrescent odour	Trace.
	0·05		Odour of warm stale blood	None.
	0·01		Odour of tar and warm blood	Do.
	0·025		Odour of tar	Do.
	0·05		Do.	Do.
Sulphate of alumina and ammonia (Alum.)	0·01	Between 80 and 86.	———	—
	0·025		———	—
	0·05		Odour of warm stale blood	Distinct.
Bichromate of potash	0·01	Between 80 and 86.	Garlic odour. Less than on 7th day	None.
	0·025		Slight sour odour	Do.
	0·05		Slight odour of hops	Do.
Chloride of aluminum	0·01	Between 80 and 86.	———	—
	0·025		———	—
	0·05		Slight putrescent odour	Distinct.
Chloride of lime	0·01	Between 80 and 86.	———	—
	0·025		Sour warm stale blood odour	Trace.
	0·05		Sour putrescent odour	Do.
Sulphite of soda	0·01	Between 80 and 86.	Odour of warm stale blood	None.
	0·025		Faint sour putrescent odour	Do.
	0·05		Slightly of warm blood	Do.

Tenth Day.

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
Carbolic acid	0·01	Between 80 and 86.	Slightly putrescent warm blood	Trace.
	0·025		Do. do.	Distinct.
	0·05		Spicy odour	Large.
Cresylic acid	0·01	Between 80 and 86.	Warm stale blood	Distinct.
	0·025		Sour odour mixed with cresylic acid	Do.
	0·05		Fœtid HS odour	Very large.
Hydrochloric acid (Sp. gr. 1·03.)	0·01			
	0·025			
	0·05			
Nitric acid (Sp. gr. 1·08.)	0·01	Between 80 and 86.	Mild spicy odour	Large.
	0·025		Strong spicy odour	Do.
	0·05		Peculiar faint spicy odour	Little.
Sulphuric acid	0·01			
	0·025			
	0·05			

Substance used.	Quantity.	Temperature.	Odour.	H S.
	Grammes.	° Fahr.		
McDougall's powder	0·01	Between 80 and 86.	Slight odour of carbolic acid	Trace.
	0·025		Putrescent odour of carbolic acid	Distinct.
	0·05		Sulphuretted hydrogen	Very very large.
Heavy oil of tar (Soda solution.)	0·01	Between 80 and 86.	Slight odour of warm stale blood	None.
	0·025		Strong odour of warm stale blood	Do.
	0·05		Tar and stale blood odour	Large.
Heavy oil of tar (Water solution.)	0·01	Between 80 and 86.	Sour warm stale blood odour	None.
	0·025		Sour sewage odour	Distinct.
	0·05		Odour of warm stale blood	Large.
	0·01		Warm stale blood odour	None.
	0·025		The same, but slightly putrescent	A little.
	0·05		The same, putrescent odour mixed with that of tar.	Do.
Sulphate of alumina and ammonia (Alum.)	0·01	Between 80 and 86.	Warm stale blood odour	Trace.
	0·025		Putrescent odour	Distinct.
	0·05		Sour putrescent warm stale blood	Very large.
Bichromate of potash	0·01	Between 80 and 86.	Slight garlic odour	None.
	0·025		Strong sour spicy odour	Do.
	0·0		Do. do.	Do.
Chloride of aluminum	0·01	Between 80 and 86.		
	0·025		Sour warm blood odour	A little.
	0·05		Sour odour	Distinct.
Chloride of lime	0·01	Between 80 and 86.	Sour warm blood odour	Slight.
	0·025		Sour odour	Distinct.
	0·05		Sour fishy odour	Do.
Sulphite of soda	0·01	Between 80 and 86.	Farmyard manure	Distinct.
	0·025		Sour warm stale blood	Very large.
	0·05		Fœtid warm blood odour	Do.

In this series of experiments where sulphuretted hydrogen and smell are chiefly considered carbolic alcohol seems to take precedence of cresylic when there are large quantities used, but the cresylic has certainly the advantage with small quantities.

Another curious result frequently before found perplexing is made here clear. The greater the amount of these acids used the greater the amount of sulphuretted hydrogen when there is much water. They appear to oxidise at the expense of sulphur compounds. If so this may be the real secret of their antiseptic power, that the moment they touch such compounds they put the molecules in a state of tension which prevents the ordinary decomposition, but in time and under water they produce another. They must be used with discrimination.

Hydrochloric and sulphuric acids failed; they seem to enter into combinations early, and to lose their character.

Nitric acid, on the contrary, stands very high.

Bichromate of potash also stands remarkably high. So far as sulphuretted hydrogen goes, it is really the first, and the smaller quantity as good as the larger.

The soluble matter of the heavy oil of tar in soda, which is equal to carbolic and cresylic acid in soda, produced least alteration with 1 per cent., but if 5 was used a change was produced. The same remarks will hold good here as were made on the tar acids.

The watery solution of heavy oil of tar was not so efficient as the soda solution.

Chloride of lime stands well if too much is not used. Here we are again reminded of the evil of an excess, just as we were reminded of it when using chloride of zinc, where that most efficient disinfectant was made to stand as the very lowest in the scale in some circumstances.

I remember going with Mr. Ellerman to try his fluid, which was at that time chloride of iron only. It was poured on some very disagreeable substances in a town's yard in Manchester, but at the moment the disinfectant touched them the smell became overpowering. Mr. Ellerman was much disconcerted. Sulphite of soda turns out well until the sulphurous acid begins to decompose. A similar thing occurs with sulphates and McDougall's powder.

VII.

The Action of Air.

Air is well known to be one of the greatest disinfectants. If a room is unwholesome, or if it is close, let the air blow for some time into it, and it is pure. If the air blows violently over a district infected with disease, the disease is in many cases removed. It may be remarked that the mere filling of a room with fresh air is not sufficient to render it pure; it seems quite necessary that the air should play about, and that the room should be filled and refilled frequently. If the whole oxygen of the air acted with equal power one would scarcely expect this result. It is explained, however, by supposing that one portion, and that very small, of the oxygen of the atmosphere is very active, and it is sufficient if even a very small portion of that comes in contact with the surfaces in the room which require to be cleansed, by having that organic matter with which they become plastered oxidised and destroyed; an equally efficient destruction of impurity is effected on furniture by the ordinary process of rubbing, but cannot be performed upon walls, books, and pictures, and in various corners not easily accessible. The effect may also be explained by supposing the unwholesome matter to be in the form of fine particles, germs, or otherwise, which would require to be removed as dust would be, and which the rapid and mechanical action of the wind would gradually sweep away. The accumulation of carbonic acid from breathing, and from the combustion of gas and candles in a room, is prejudicial; but the products are very rapidly removed, simply by refilling the room once with fresh air. It is not so with that matter which may be called organic. Although, as a general rule, this method of cleaning a house by sweeping, washing, and abundant airing is decidedly the wholesomest and best, and may be considered to be the standard method, there

are cases in which it proves itself insufficient, when, for example, the external air is unwholesome, either by being infected by the emanations from marshes, or, let us suppose, from air containing germs capable of producing any other disease. The otherwise wholesome and refreshing entrance of air may bring in vapours or particles of a most deadly kind. In such cases it seems natural that the ancient practice of fumigation should be used, the only method by which these accompaniments of the air can be reached. If the air be really the vehicle of any disease, it seems natural to suppose that fumigation, or the use of gases or volatile substances, should be the only mode of effecting a cure, or, at least, a prevention, and until these opinions shall have been proved entirely futile it seems as if we should be compelled to resort to this practice. For these reasons it seemed to me rational to compare these experiments in which meat and blood are preserved fresh with the operation and prevention of cattle plague and similar diseases. Those chemical agents which cause putrefaction in the one case will be destroyed by fumigation, and in the other those germs which cause the growth of fungoid substances are destroyed, or, at least, rendered incapable of taking root. If the germs which cause, if they do cause, plague, are at all similar, they will be similarly affected. The experience of mankind is in favour of fumigation; it seems as if all that was required was a more complete method of effecting the object than has hitherto been found. Whether any substance of which we have now the command would be found complete in all cases is to be tried, or whether it is practicable to use several in such a way as to make them completely operative, considering the habits of farmers and the circumstances under which the operations about farms must be effected.

VIII.

The Action of Water.

The action of water in removing deleterious substances is partly mechanical; as such it is a valuable agent; it lifts or makes lighter particles not easily reached, and the impure matter is diffused through the liquid, to be oxidized without necessarily evaporating. Without it, it seems impossible to produce absolute purity of surface in most cases. When it is saturated, however, it begins to give off vapours into the atmosphere, and, as water may be said to be equal to a porous body having an unlimited surface, its activity is very great. It absorbs oxygen rapidly, oxydises the organic matter, sends forth carbonic acid, and along with it many vapours into the atmosphere, and intensifies the operation to such an extent that bodies which would have lain in a mass for years undecomposed are, when mixed with water in a moving stream, completely rendered invisible in a few days. This has been found in a remarkable case in which the sewage of a large town, moving slowly after being mixed with an immense excess of water, has been found utterly to disappear, so that not the slightest trace of soluble matter of an organic origin could be found in it. Even the deposit gradually diminishing had ceased to be offensive, the ammonia, which was nearly a grain per gallon to begin with, could not at last be discovered, whilst the evaporation seems to have gone on in warmish weather at the rate of one grain per square foot daily. Although, therefore, water is a wonderful agent of purification, it is also an agent for the contrary, because it causes a very rapid and effervescing decomposition of organic matter, and, if in enormous quantities, it sends out impure as well as pure gases into the atmosphere. It is for that reason, apparently, that wet cesspools have been found so dangerous, and that stagnant pools are also dreaded, and for the same reason the engineers of the Board of Trade long ago determined to remove the water of waterclosets out of the town as rapidly as possible, in order to prevent decomposition, and to throw it upon the land if possible at once. This seems to be a wise arrangement; but, if we are to judge from the experiment alluded to, it seems also quite impossible to carry the sewage to a great distance, when the water with which it is mixed is beyond a certain amount, because the destruction of the material is excessively rapid. So in experiments upon blood we find that whilst one tenth per cent. of a disinfectant is sufficient to preserve it unaffected for any length of time hitherto tried, five per cent. seems required when water is added to the blood in large quantities. The true reason of this is not very clear. It would seem as if the disinfectant either lasted only a certain time, or attacked only a limited portion of the blood, whilst the second portion by degrees assumed that condition in which it could decompose, and required to be treated separately, and so by degrees more and more of the blood underwent a change. The action of water in disinfecting the soil is similar, but it is aided by the porous substances with which it is surrounded, and the soil itself is a remarkable agent of purification. It seems scarcely to be doubted that when rain washes the air it also renders it more wholesome in many respects. The unwholesome matter is washed into the ground, and it there disappears; all noxious ingredients, however, are not removed by the soil, and the existence of soil with entozoa and numerous undesirable living creatures is a sufficient proof that the soil is imperfect as a disinfectant, or, at least, incapable of reaching many of the cases which art is compelled to attempt. Indeed the soil in many places is itself the origin of emanations of the most dangerous kind, instead of being a source of purification. We cannot, therefore, rely upon it in extreme cases, even if it were possible to subject the atmosphere in which cattle lived to its influence, which can only be done very partially indeed. For these reasons it is desirable to disinfect the soil itself where disease exists. I have already said that the soil on the meadows at Carlisle was remarkable from its want of infusoria and life generally; and Mr. McDougall, who has grazed animals on it for several years, informs me that foot rot has not once appeared, although it was common before he adopted his mode of applying disinfectants. Yet his disinfectant for the land is by no means excessively strong, and comes nearer to the mild agents called by Berkeley tar water. But by constant use this has been found enough, although not enough if tried for a rapid result. It is better to act on the principle of applying the disinfectant to prevent putrefaction. Some persons, not understanding it, have allowed the sewage matter to putrefy first, and, as we may see from these experiments, it is very difficult then to obtain great purity.

In air and water we have in reality the action of oxygen; but we may have concentrated oxygen, and we may have oxygen in an active state. If concentrated oxygen is put into a vessel with blood, it is absorbed quietly, without true putrefaction and without any effervescence. It retards for a while the progress of putrefaction, but its ultimate effect is said to be rather to hasten it when contact with the air is renewed. This examination is not completed. Active oxygen, or ozone, has a very distinct power in preventing putrefaction. If it is formed by the action of sulphuric acid upon permanganate of potash, the putrefaction is long delayed; but in order to succeed completely it requires to be pretty well concentrated. How much must be present is not yet ascertained, but decidedly an amount inconveniently large in practice is required. When phosphorus is used to form ozone, putrefaction is completely prevented; but how much is owing to the active oxygen, and how much to the phosphoric vapour, remains a question. The mixture is so very powerful that in passing it through caoutchouc tubes they were very rapidly eaten through. It is capable of destroying any organic substance which is put in connection with it. Tried at one time in a solution of sugar, it was found that the color was certainly removed and the sugar also. When the phosphoric vapours were removed, there

was still active oxygen, which, however, had not these violent effects. In contact with flesh it will be seen from Table I. that this vapour prevents any putrefaction or fungus, attracts water in great abundance, and destroys the flesh, and that at the bottom of the bottle is found a mixture chiefly containing phosphate of ammonia (not carefully examined), whilst the flesh has been in a short time almost entirely consumed. The extraordinary power of this vapour in destroying organic matter must no doubt render it one of the best disinfectants ; we can suppose neither germs nor decomposing organic bodies to remain unaffected in its presence. Whether it can be applied to a very great extent or not may be a question ; and whether it is not accompanied with certain dangerous properties is also to be considered. We know that those who work with phosphorus are sometimes affected with a peculiar disease, which attacks the teeth and jaw bone, apparently much in the same manner as the flesh in the experiment alluded to, for it seems not to have the power of attacking sound matter, but begins at decayed teeth, making its way to an unlimited extent to the bone. A large maker of matches in Germany, who employed about a thousand people, informed me that by taking care to employ none who had unsound teeth, or any pregnant women, he was able entirely to prevent the disease from entering his workshop. Because of their activity I have been rather afraid of recommending these vapours, spoken of by Dr. Moffat with great praise, although he has used them to a large extent, I believe, and has found no evil effect from them. I have not used them for ventilation, and can only speak of the experience of others, which, however, has been on a scale sufficiently large to demand attention. I should rather refer to him for a practical method of treating large establishments with these vapours.

Schœnbein's belief that turpentine and other volatile oils produced a similarly active oxygen was the cause of the trials mentioned in the same Table, and the result will be seen to have been that a sufficient amount of oxygen to prevent putrefaction was not generated. The use of oxygen concentrated in salts, such as permanganate of potash or mineral chameleon, has been largely adopted under the name of Condy's fluid. It has already been said that this is a very rapidly oxydising agent, destroying impure substances instantaneously, and preventing emanations of a disagreeable kind. Unfortunately it does not act long, and although not decomposed so rapidly by fresh organic matter as by putrid, it still is decomposed, and the result is that an immense waste takes place. It cannot be left alone, to act only on impure and to leave the pure matter alone ; but if frequently used it will destroy impure matter with great certainty, and leave no smell of any kind behind it, as there is no very volatile vapour formed. It is, however, only capable of being used in a liquid state, and the use of large amounts of water is not in all cases to be recommended, and frequently to be carefully avoided. It is also incapable of acting on the air of a whole apartment, as it is not volatile ; it can, however, act upon the air like other liquids and solids, by preventing the rise of vapours into it, although not by obstructing them or destroying those germs which we have supposed to exist. The use of peroxide of hydrogen, sold in a diluted state by Messrs. Garden and Robins, is another form of concentrated oxygen, and is one of the most powerful and beautiful of disinfectants. A comparative value is given in a Table (No. 2.) The result, with peroxide of hydrogen, is very strange, as it not only destroys the smell of very putrid blood but frequently communicates to it an odour aromatic and agreeable. It is continually giving off a little active oxygen, but the vapour over it is not sufficient to act as a disinfectant.

It promises some day to be a very valuable agent, but how far it may be used at present, even if it could be sold at a very moderate price, it is perhaps impossible to say. The disinfection would be very complete with it ; but we do not know well the effect on human beings of even a limited amount of active oxygen. A few experiments will be very valuable, to show what the meaning of a moderate amount is, and what of an immoderate. I may go so far as to say that the amount of active oxygen given off is not sufficient to prevent meat from putrefying when hung in a bottle with peroxide of hydrogen at the bottom ; or, in other words, it does not destroy germs. In all probability, therefore, there is not enough to affect animals injuriously. It is very much too expensive to be used on a large scale, and does not destroy more matter than Condy's fluid, although it does it more elegantly. Whoever cheapens it will do good to society.

IX.

Experiments were made to find what substances are most active in destoying living organisms and germs, without coming in actual contact with them.

The following were tried :—

Phenylic and cresylic alcohol.
Amylic alcohol and wood spirit.
Heavy oil of tar and chloride of lime.

Mouldy paste was exposed to the vapour arising from the substance ; each arrangement being placed far enough from its next one so that the mould in one could not be affected by the substance in another.

The chloride of lime was the most destructive ; phenylic, cresylic, and amylic alcohols, and wood spirit acted as colytics preventing all action and growth ; if any of these four latter bodies is to be preferred it is wood spirit ; the heavy oil of tar caused least change. On the third day the chloride of lime had destroyed it, but the others seemed not to have gone farther than to arrest all change at once, leaving the mould to die.

The mould by itself had grown to great luxuriance during the same time. See also remarks on soil.

X.

Ozone.

Schönbein's singular discoveries and patient inquiries have had a great effect on our views of elementary substances, and even of matter itself, although he himself has mainly viewed the great part played by oxygen in nature. So difficult has he been to follow, that some have preferred to call him an enthusiast whom reason had ceased to guide ; but where he has been he has left marks so clear that no man can doubt that he has made genuine voyages of discovery, although there may be still some uncertainty about the map to be drawn. The discovery of the action of powerful oxidizing agents in the air, whether to be called ozone or not, is a remarkable event. It was at once the experimental proof of the existence of influences which scientific men had been disposed to deny, because they could not see their possibility, and a beginning of new inquiries.

The test given by Schönbein for ozone has been iodide of potassium and starch. Ozone sets iodine free, and that body, with starch, forms a blue colour. When paper is soaked in the mixture it becomes an ozonometer, and the depth of the blue colour is a measure of the amount of ozone. Air, which is to the senses very pleasant, gives the blue colour ; air of close places does not give it. Perhaps no one has watched the changes more carefully than Dr. Moffatt of Hawarden, and his results certainly seem to indicate a very wholesome purifying oxydizing body in the air, as Schönbein explained it. For practical purposes, it matters little if this is pure ozone or only peroxide of hydrogen, or even an oxide of nitrogen, or other thing. Its existence does not seem to be an absolute proof of the wholesomeness of an atmosphere, but it seems to be found always in atmospheres proved to be wholesome. In a smoky town it is never found, although the atmosphere is invariably acid, and this seems to be a sufficient proof

Dr. Angus Smith. Report to Commissioners.

that mere acidity is not the cause of the phenomenon. But it may be said that it is nitrous acid before it is acted on by the sulphurous acid of smoky towns; if so, the test for the acid is much more difficult to be obtained than that for ozone. The so-called ozone indications are found on the seashore in ten minutes in a fine breeze; but for acid by no means without great labour. Peroxyde of hydrogen gives the same indications, and even the oxygen coming from it, and the air above the liquid, act in a similar way. May there not be peroxide of hydrogen in the atmosphere? has been asked. It is abundantly clear that there is a subtle something existing in the atmosphere. Half a mile from Manchester it is found in abundance; but let the wind blow at any speed it is never observed in the town. It must be removed from the air in a few seconds. I have tried for it daily for months together and have never found it in the town. Indeed, so subtle is it, that it seems to scent Manchester at a distance; it refuses to approach as if the influences of the city were sufficiently powerful to pass out against a breeze, or to have planted themselves firmly enough on the surrounding land to affect the air in the immediate vicinity of the city. The difficulty still exists that the blue colour is produced by many methods. This subject is under examination by a committee of the French Academy.

It is absurd to speak of town air being unaffected by manufactures. I have explained to myself the results given, as I suppose others have done, by supposing the sulphurous acid to take up the active oxygen. At any rate in cities producing much smoke we are deprived of this body—ozone. Is it for good or for evil? The answer is clear enough,—that it must be hurtful. But this is not the only reply. The substances bringing this evil may also be bringing certain advantages.

The sulphurous acid of the coal smoke is disinfectant, but we know at least that it destroys the so-called ozone condition of the air; still if good it is so trifling that we hear of no disease which it drives from our towns, although it is probable that by a larger amount of sulphur some diseases might be removed. We lose the oxidizing influence of the strange new body which again destroys the sulphurous acid, which is expected to disinfect, leaving chiefly sulphuric acid, a weaker disinfectant; the result then is, that we really lose one of the valuable qualities of the air, whilst we receive none sufficient to compensate for it, but on the contrary, have dilute vitriol to breathe, so to speak. The mere smoke of coal, with its sulphur and its carbon compounds, has always been allowed to go too free from accusation.

Ozone is said by Schönbein to be produced by the evaporation of turpentine and many oils, as well as by many organic substances, which are believed to be in a state of oxidation. Apparently, the filthiest places have the means within themselves of producing ozone and clearing the atmosphere of their own impurities. I do not pretend to have gone over the whole range of ozone literature for the purpose of this paper, and have no time to make references needful for an exact revision of the subject; but the action of turpentine, citron oil, and other volatile substances, could not be overlooked when they were supposed to be connected with oxidation,—a function of ozone. This oxidation seemed to be a clue to the facts and traditions regarding perfumes of all kinds used in all ages to prevent disease especially infectious, and to remove moths, mildews, and all those attacks to which clothes and food are subject. For this reason the following oils and volatile substances were tried. All who have read of ancient plagues will remember the frequent use of myrrh, camphor, vinegar, and numberless balsams and perfumes; and those who have attended to our own country habits will know of numerous other substances.

The result of the examination seems to be that these substances are antiseptic, but not to such a powerful degree as others to be mentioned; they are, however, agreeable at the same time, which is not the case with any of the most powerful antiseptics. Their constant use has no doubt a beneficial influence in cases where the evils to be avoided are not very great; but they have failed in bad cases, as we here find they fail to preserve the meat when the tar acids and similar substances showed no signs of failure. I look at their action as a proof of the great accuracy and the remarkable delicacy of observation to be found in popular beliefs. Ages of men with acute senses have been able to find the existence of qualities which we are apt at present to overlook, having an easier mode of observation in our hands, namely, chemical experiment, in which the senses being so much aided do not demand exalted delicacy.

It may be seen that few of the 35 substances hitherto tried in this way produced indications on ozone paper. Compare Table I. with Table following this.

None of those which can be received as perfumes or even light oils have produced sufficient vapour at the ordinary temperature to preserve, for a long time, meat standing immediately over them. Some, however, have preserved it longer than others. It was an interesting question. Did those which preserved it longest produce most ozone? It is quite clear that the amount of preservation was not in proportion to the amount of ozone. Turpentine is a bad preserver; oil of mustard produces no ozone and is a very active preserver. Even oil of orange peel, which, of all others, produces most ozone or active oxygen is comparatively a bad preserver. Although not for this inquiry of practical value, it was interesting to inquire if when no ozone was at all produced, some other influence affected the blueness of the starch paper. In the same bottles were put pieces of blue litmus paper and after some days the result was observed. It will be seen that in five or six cases the blue had become red. In fact an acid was produced and not only ozone. In one or two cases the paper may have appeared to be rather bleached, which may have indicated ozone; but in the most decided cases, such as the oil of orange peel, the paper was first of an intense red and afterwards white. In order to examine this more carefully red papers were put in the same position, and in some cases a blue colour seems to have been produced. This certainly is against the exclusive ozone theory of these reactions. There is room for more inquiry here; but it seemed to me well to see if the ozone to be gained were really a great power or only a trifling one. I think that, so far as these oils are concerned, it is trifling in all and non-existent in other cases.

EXPERIMENTS were made to ascertain if ozone was formed during the evaporation of the following substances, with the results marked opposite each; the quantity of ozone formed is represented in arbitrary numbers, 1–10, according to the intensity of color imparted to paper prepared with iodide of potassium and starch.

	After 18 Hours.	After 24 Hours.	After 48 Hours.	After 72 Hours.
Naphthaline	None.	None.	None.	None
Cresylic acid	Do.	Do.	2	2
Carbolic acid (pure)	Do.	Do.	None.	1
Coal naphtha	Do.	Do.	Do.	?
Canadian petroleum (crude).	Do.	Do.	Do.	1
Aniline	Do.	Do.	?	1
Nitro-benzole	Do.	Do.	None.	None.
Turpentine	A little.	Increased.	7	9
Kreasote	None.	None.	None.	None.
Wood naphtha	Do.	Do.	Do.	Do.
Pyroligneous acid	Do.	Do.	Do.	Do.
Acetic acid (pure)	Do.	Do.	Do.	Do.
Camphor	Do.	Do.	Do.	Do.
Oil of cinnamon	Do.	Do.	1	1
Oil of mustard	Do.	Do.	None.	None.
Oil of bergamot	?	?	1	1
Oil of bitter almonds	None.	None.	None.	¼
Oil of pepper	Do.	Do.	1	1
Oil of cumin	Do.	Do.	2	2½
Oil of lavender	Do.	Do.	2	2½
Oil of hops	Do.	Do.	None.	¼
Oil of thyme	Do.	Do.	Do.	1
Oil of rue	Do.	Do.	Do.	2
Oil of rosemary	Do.	Do.	?	2
Oil of juniper	Considerable.	Increased.	5	5
Oil of orange peel	Do.	Much colour.	9	10
Oil of peppermint	None.	None.	None.	None
Oil of lemons	Do.	Do.	Do.	¼
Oil of valerian	Do.	Do.	Do.	None.
Oil of aniseed	Do.	Do.	Do.	1
Fusel oil (amylic alcohol)	Do.	Do.	Do.	None.
Ess. pine apple (butyric ether).	Do.	Do.	Do.	Do.
Gum asafœtida	Do.	Do.	Do.	Do.

Experiments made to ascertain the action of the vapour of the following substances on litmus.

—	After 3 Days.	After 4 Days.	After 7 Days.
Napthaline	Very blue.	—	Red.
Cresylic acid	Blue.	Red.	—
Carbolic acid (pure)	Red.	—	—
Coal naphtha	Blue.	—	Blue.
Canadian petroleum (crude).	Do.	—	Do.
Aniline	—	—	Red.
Nitro-benzole	Red.	Red.	Do. almost white.
Turpentine	Do.	Very blue.	—
Kreasote	—	—	Red.
Wood naphtha	Very blue.	—	Blue.
Pyroligneous acid	Red.	Red.	Red.
Acetic acid (pure)	Do.	Do.	Do.
Camphor	Blue.	—	—
Oil of cinnamon	Very blue.	—	—
Oil of mustard	Blue.	—	Blue.
Oil of bergamot	Do.	—	Do.
Oil of bitter almonds	Slightly red.	Red.	Red.
Oil of pepper	Blue.	—	Blue.
Oil of cumin	—	—	—
Oil of lavender	Blue.	—	—
Oil of hops	—	—	Slightly blue
Oil of thyme	—	—	Do.
Oil of rue	—	—	Blue.
Oil of rosemary	—	—	—
Oil of juniper	—	—	—
Oil of orange peel	Red.	Red.	Red.
Oil of peppermint	—	Blue.	Blue.
Oil of lemons	Red.	—	—
Oil of valerian	—	Blue.	Blue?
Oil of aniseed	Blue.	—	Slightly blue
Fusel oil (amylic alcohol)	Do.	—	Blue.
Ess. pine apple (butyric ether).	Do.	—	—
Gum asafœtida	—	Blue.	Slightly blue

Petroleum is a very poor disinfectant compared to tar acids. Probably the petroleum has a little either of carbolic acid or an allied compound, to which it owes all its disinfecting power. Tar oils, which most resemble petroleum, have also a weak disinfecting power; and when the carbolic, &c. acids are washed out there is no disinfecting power remaining.

XI.

Additional experiments were made on disinfection on a larger scale. Boxes containing each a hundredweight of human excrement, were kept in a warm building, and treated with

Carbolic acid,	A mixture of equal parts
Cresylic acid,	of cresylic acid and sul-
Common salt,	phite of soda,
Chloride of zinc,	Heavy oil of tar,
Perchloride of iron,	McDougall's powder.
Chloride of aluminum,	

A change was first noticed in the matter on the seventh day after adding the disinfectants, in the case of the first six boxes; the others were first looked at on the tenth day.

These experiments were made at the Eureka Manure Company at Hyde, where a peculiar mode of collecting the refuse of the town is adopted.

The remarkable power of common salt, is to be observed here:—

—	On the 7th day.	On the 17th day.	On the 27th day.	On the 34th day.
Carbolic acid — Quantity used, 2oz. by measure.	No decomposition. A sickly smell.	As before	Fungoid growth on the surface; no sulphuretted hydrogen and no ammonia given off.	Not much sulphuretted hydrogen but ammonia is evolved.
Cresylic acid — Quantity 2 oz. by measure.	The same	Decomposition commencing.	Fungoid growth. A little ammonia and sulphuretted hydrogen.	Ammonia and a little sulphuretted hydrogen evolved.
Common Salt — 2 oz. by weight.	Very little decomposition and a slight smell.	Decomposing slowly; a slight smell of sulphuretted hydrogen.	Fungoid growth. A little gas evolved. No ammonia or sulphuretted hydrogen.	Ammonia evolved, but no sulphuretted hydrogen.
Chloride of zinc — 8 oz. by measure of a 50 per cent. solution.	Decomposition and a little smell.	Little decomposition, and the peculiar sour smell noticed when putrid blood was treated with chloride of zinc or iron.	No sulphuretted hydrogen, a little ammonia.	The same.
Perchloride of iron — 8 oz. by measure of a solution containing 20 per cent.	Decomposition and a stronger smell.	Black colour from sulphide of iron; the same peculiar smell.	No sulphuretted hydrogen, a little ammonia.	Ammonia and very much sulphuretted hydrogen evolved.
McDougall's Powder — 1 lb.	Decomposition and ammoniacal smell.	Fungoid growth on the surface. No sickly smell, a little ammonia disengaged.	Fungoid growth. Much gas evolved. Sulphuretted hydrogen, but no ammonia.	Much ammonia and sulphuretted hydrogen.

	On the 10th day.	On the 17th day.
Chloride of aluminum — 4 oz. measure of a 50 per cent. solution.	Decomposition and very bad smell. Fungoid growth.	Very much ammonia and sulphuretted hydrogen.
Heavy oil of tar — 2 fluid ounces.	Fungoid growth. Tarry smell. Sulphuretted —much gas evolved.	Much sulphuretted hydrogen and ammonia.
Sulphite of soda and cresylic acid. 1 oz. of a mixture with water, containing $\frac{1}{5}$th of each substance.	Fungoid growth. Rather a sickly smell. Sulphuretted hydrogen evolved.	The same as above.

XII.

Abridgment.

Substances best suited for preventing decomposition.

Acid metallic salts seem so well qualified for this *when water is present* that they may be said to stand first.

Of these again chloride of zinc stands so high that it may be called the first. The chloride of mercury and sulphate of copper are perhaps superior, but are too expensive for general use. Chloride of iron stands high.

Common salt stands very high in this test, and as it can be had for a small price it will no doubt be more used. It seems to have been forgotten that the substance which preserved sound organic matter would also preserve refuse.

Sulphates are readily decomposed and give out sulphuretted hydrogen; but when there is much water, as in sewage, sulphate of alumina acts as an excellent disinfectant, and if succeeded by lime removes almost all traces of matter oxidizable by the oxygen in chameleon.

Sulphites are excellent disinfectants, and remove the most offensive part of the smell rapidly. If, however, they are allowed to stand long in water they decompose, and give out sulphuretted hydrogen. It is quite a mistake to say that sulphurous acid does not act when combined. Its salts are best used along with the tar acids. The substances disinfected ought to be removed in at least three days, and better if every day. They cannot be used for preserving from decomposition for any great length of time when water is present.

Chloride of lime has not a good preserving power, but a great destructive power.

The tar acids, otherwise carbolic alcohol and cresylic alcohol or acid, are excellent disinfectants in all cases, but are not equal in water to the metallic chlorides mentioned.

Disinfection where there is little moisture.

In this case the tar acids do not seem to have any rivals, so little is sufficient for the purpose. Dry sulphites mixed with them are an improvement, but of themselves they have a marvellous power of preventing decomposition.

The use of fusel oil, &c., has been mentioned. For particulars see the Tables.

It has been asked if carbolic acid prevents the activity of infected matter; will it also destroy it? This is not proved to be the case instantly. Pettenkofer (in "Allgemeine Zeitung," February 4th, 1866) says that carbolic acid preserves inert the ferment cells, but when it is removed they become active. It seems true that the disinfectant must be used continuously, and the impure matter must be cleared away continuously, whilst soon in time, and especially in the earth, the infectious matter will die. We must put it out of the position where it will be dangerous. It is difficult to use enough of any disinfectant to destroy poison where life must be preserved, and impossible to do so instantly where the poison is strong. But these acids render fermenting matter inert, and this is the great object to be first attained. (Experiments since made lead me to believe that Pettenkofer must have used very weak acid.)

For disinfection when putrefaction has advanced, and the smell is to be removed.

There is perhaps nothing superior or even equal to chloride of lime in this case, unless we except peroxide of hydrogen and permanganate of potash, which are expensive.

If, however, it is not desired to destroy the manure or to leave the mixture moist, it is necessary to try something else, viz.,

A mixture of sulphites is good for this purpose with tar acids, but the action is not so rapid or violent as with chloride of lime.

Disinfection of the Air.

This is done by—

Muriatic acid,
Chlorine,
Sulphurous acid,
The tar acids chiefly.

The first is made by pouring vitriol on common salt until the space is filled with a distinct smell of the rising vapour.

The second by pouring muriatic acid on black oxide of manganese, or on chlorate of potash, or on chloride of lime. The first plan is probably the cheapest. A very faint trace ought to be kept in the atmosphere, but it ought to be constant at first, and when the cattle are absent it may be used in great excess.

Sulphurous acid is made by burning sulphur.

The tar acids are most manageable, and require only to be laid down, when they evaporate gradually and fill the air.

Sulphurous acid and tar acids can be used together if desired, but sulphur cannot be used with chlorine or chloride of lime.

Solid substances containing little moist matter and little organic matter are disinfected by very weak solutions.

Bones dried, but musty, were disinfected by 1 of cresylic acid or of chloride of lime to 1,000 of water. They stood about a day. With 1 per cent. the action is in a few minutes.

One per cent. of chloride of lime in water is not enough for flesh and such solid matters. Five per cent. is abundant. Stronger solutions are not wanted, except when great haste is required in very bad cases.

The following may be proposed:—

Tar acids and chlorides of lime are chiefly recommended, as the smell shows that they are present; but when substances require to be kept long, especially if very moist, chloride of zinc is most efficient.

1. Dry cattle skins—May be disinfected with cresylic or carbolic acids, 2 oz. being mixed with 1 gallon of water, and poured over so as to wet them, or sprinkled with chloride of lime (sol. A.)
2. Dry horn tips—Should be moistened with a solution of 2 lbs. of common salt to the gallon of water, having mixed with it about 3 ozs. of cresylic or carbolic acids, or be washed with a solution of chloride of lime containing 1 lb. of the same in 2 gallons of water.
3. Salted and dry cattle gut—If salted, without disinfection.
4. Melted tallow in casks—Washed with the common salt and carbolic acid solution mentioned above (sol. A.), or with disinfecting soap.
5. Cows' hair—Cresylic or carbolic acid in the proportion of 1 oz. to the cwt. should be diffused through the material.
6. Pigs' bristles—The same as cows' hair.
7. Sheep's wool in bags—The same; or may be washed in the sol. A., or McDougall's sheep dip may be used, which is known not to injure the wool.
8. Whole horns—Should be washed with sol. A, or sprinkled with chloride of lime, $\frac{1}{2}$ lb. to the cwt.
9. Hoofs—The same.
10. Melted tallow in skins—Should be moistened outside with sol. A, or washed with disinfecting soap.
11. Fresh bones—Very difficult to treat. The mode less likely to injure for subsequent purposes is heating to 200° F., but if this cannot be done, washing with a solution of one part of cresylic or carbolic acid in 100 parts of water will produce little injury in the subsequent manufacture, and will disinfect.
12. Fresh skins—Should have common salt spread over them for 12 hours, and afterwards be washed with water containing 2 oz. of carbolic or cresylic acid to the gallon, or laid in a solution of chloride of lime, $\frac{1}{2}$ lb. to the gallon of water for 10 minutes, or in a solution with 2 lbs. to the gallon for a few seconds, or with $\frac{1}{4}$ lb. to the gallon and 3 oz. of muriatic acid.
13. Fresh guts—Should be treated with salt in the state of powder, together with carbolic or cresylic acid, the latter being in the proportion of 2 oz. to the cwt.
14. Raw flesh—Should be salted, and treated with the carbolic or cresylic acid solution, if not to be used for food, or the acids may be used without water.

15. Raw sheep skins—Should be treated with McDougall's sheep dip, if there be wool on them, or perhaps soap and carbolic acid.

For the following articles an addition of carbolic acid might be recommended in bad cases.

16. Waggons—Should be washed with solution of carbolic acid or with disinfecting soap, or with soda and carbolic acid.

Platforms—The same.

17. Articles used at places where the disease is known to have existed—The same.

18. Ships—The same, or instead of this soap, tar acid and caustic soda, which mixture may be made stronger than the soap.

19. Pens—Treated as cowsheds.

Treatment of Dead Cattle to be preserved for Manure.

About twenty years ago a young surgeon from the Isle of Man, named Cookson, adopted a plan of preserving swine in America, by injecting the blood vessels with brine. It was carried out for a time by Messrs. Thomas and Frank Jewsbury of Manchester. The operation could be performed in a few minutes on a whole animal. Dr. Morgan of Dublin has renewed the method with improvements, and it may be seen carried out in that city, both on human beings and the lower animals. The success of this is complete. He adds, potash salts, nitrate of potash, and phosphorous acid, chiefly.

"The animal is killed by a blow on the head, piercing the brain, and causing instantaneous death. The chest is then at once opened, and the heart exposed. An incision is made into the right side of it, either the right ventricle or auricle,—and directly another into the left side (the left ventricle); the blood from the right side (venous), and from the left (arterial), immediately rushes out. When it has ceased flowing, a pipe is introduced into the incision in the left ventrical,—and so into the aorta, or great vessel leading through the body, *i.e.*, the trunk of the circulatory tree, and is there firmly retained. This pipe can be connected by a coupling with a stop-cock fixed to a flexible tubing, 20 to 25 feet long, and this tubing communicates with a tank raised the height of the length of the tube, into which brine and a little nitre is put when well strained, (about one gallon to the hundredweight). The stop-cock is connected to the pipe in the aorta, and the fluid let on; it will rush out at the incision in the right side of the heart, after traversing all the circulatory organs, in four or five *seconds* in sheep, swine, and such like,—and in nine or twelve *seconds* in oxen, and in two minutes or so in the latter, and proportionately less in the former, will have run through—thereby clearing the vessels and capillaries, and preparing for the second stage, which is performed simply by closing the incision in the right side with a strong sliding forceps, and thereby rendering the circulatory system perfect, as originally, but with the vessels free and ready to receive the preservative fluid."

But although I speak of these things as recent, the method is in principle older. We have apparently only to enter Dr. Morgan's dissecting room, where numerous bodies lie, entirely without odour, to be convinced that the process is effective, and may in many cases be carried out. Mr. Stone, of Manchester, says it has been adopted at the Manchester School of Medicine for a longer time, so far as the mechanism is concerned.

The same process may be practised on condemned cattle.

A workman can learn the process rapidly, a moveable pump could be used as the instrument for injecting the preserving fluid. A stronger than Dr. Morgan's may be used. The mere mechanical method of treatment, is to my mind a wasteful destruction of matter, most valuable as manure. By this simple mode of disinfecting, we may obtain, at least, something worth preserving amongst the ruins of our cattle. The outside should be treated as hides are, and the blood run off into the nearest land and disinfected. Rather than bury such an amount of precious phosphates and ammonia, it might be sufficient to saturate the animal with muriatic acid, the very efficient, cheap, and penetrating disinfectant of Guyton Morveau, more valuable probably for this purpose than for fumigation. The carcase could then be taken, to be converted into manure, without fear of communicating disease.

Dr. Angus Smith. Report to Commissioners.

XIII.

Disinfection to prevent Cattle Plague.

Summary of reasoning.

It is believed that the infectious matter of the plague travels in the atmosphere chiefly, and consists of minute particles.

They are organic and active.

Certain vapours and gases destroy the activity of all organic substances.

Some gases destroy the substances themselves.

The great power which certain vapours have, as shown in Table I., leads us to believe the matter of the Cattle Plague will be prevented from change, exactly as other matter is prevented.

Mould and fungoid matter generally is either destroyed, or prevented from growing by the same vapours, showing that it yields as other organic matter.

Infusorial animals, animalcules found in putrefying liquids, and in the soil, yield in a similar way, showing that they make no exception.

Matter that has begun to putrefy is caused to cease, and becomes fresh to all appearance. It may be considered as absolutely certain, that all organic substances, whether of the nature of plague, or any other disease, will be arrested in their course of activity by the same substances.

Dead matter has been spoken of. The question may now be asked, will these vapours arrest changes in living matter? They will; and living beings must all succumb under their powerful influence.

The next question is which will resist most, the living being or the dead one? The living animal has a power of resistance to decay that dead animal matter has not. Suppose the dead matter has a resistance of two, and the living matter a resistance of three, dead matter will decay and become diseased before living beings will yield.

But will living animals resist the destructive influence of disinfectants to a greater extent than dead matter? I believe we may answer, yes distinctly; at least for a certain time. Flesh will absorb carbolic acid and become so saturated that when roasted it will cease to smell like flesh. I am informed that men working in equally strong vapour are not injured. Of course it is not desired that the vapour should be present except when danger threatens.

I have it from good authority, that no foot rot is found on ground treated with carbolic acid and lime, although previously it existed and exists still on the next fields.

The chlorine which so rapidly destroyed fungoid substances had no injurious effect on men, at least during any similar length of time. The solutions which killed the infusory animals suddenly might be taken by man with ease.

All disinfectants, like medicines, are poisonous in great quantities. It is believed that there is an amount which will destroy the germs of disease and not destroy life. If the life is very weak it may yield before the disease. If the disease has made great advances it will require more to destroy it than even a strong life can bear.

It is believed that the rudiments of larger experiments may be found here in great numbers.

It is probably easier to poison the plague by chemical means than to stamp it out by mechanism. Disinfection may be driven to the utmost; better to kill an animal by a good disinfectant, than to let it die putrid and ready to kill others.

Practical application.

According to the principles laid down the air must be treated, and where there is no disease there is only a secondary use in treating any thing besides the air.

Several cowhouses have been treated with carbolic acid with very excellent results. The mode has been first to remove from the floor the mass of manure which too often adheres to it; secondly, to sprinkle the floor with strong carbolic or cresylic acid. Next to wash the walls, beams, and rafters, and all that is visible in the cowhouse with lime, in which is put some carbolic acid, 1 to 50 of the water used, or with strong carbolic acid alone. Next to make a solution, containing 1 of carbolic or cresylic acid to 100 of water, or perhaps still better 60 of water, and to water the yard and fold until the whole place smells strongly of the acid. Only a few farms have been treated in this way so far as I know, but in each it has been successful.

It may be well to give the cattle a little of the weak solution of carbolic acid, but this has not been so fully tried as the external use. The washing of the mouth and entire animal with the weak solution may be attended with good results, especially in the early stage of disease; but I know nothing of cure, and speak only hopefully of prevention. The animals seem to have an instinct for disinfection, and lick substances touched with this acid. They must not be allowed to drink it, as when strong, as already said, it blisters the skin and especially the mouth and tongue.

We may use other methods. The first and fourth may even be used together, but not with the second.

2d. Chlorine may be used to fill the atmosphere as completely as carbolic acid was used. It is a refreshing gas in minute quantities, and good accounts of cases of Cattle Plague prevention by it have been heard of.

An excellent way to make it is to mix about 1 lb. or more, according to the size of the space, of chloride of lime with $1\frac{1}{4}$ lb. of potash alum, or of alum cake well pounded. Ammonia alum will not do. The chlorine is given off gradually. Another plan, recommended by Mr. Stone of Manchester, is to throw a crystal of chlorate of potash into a dish of muriatic acid when it gradually dissolves and gives off chlorine. (I would add some others uggestions sent by Mr. Stone, but I believe he will make his own ideas public.) The amount must be regulated by the sense of smell. There must be a distinct odour in the cowhouses. A difficulty occurs here. Carbolic acid and cresylic acid can be used in-doors and out of doors, and it is difficult to remove the smell; this chlorine fumigation is not so easily transferred, and it is not clear how to fumigate well the yard and the fold as well as the large masses of manure lying in the fold with any vapours but those first mentioned. For very impure places muriatic acid and black oxide of manganese may be used.

3rd. Muriatic acid may be used to fumigate. There is much to be said in its favour. It is not so hurtful as it appears to be, it is a little irritating at first. It is best made by throwing common salt on vitriol. The same difficulty occurs as with chlorine, it is not easy to fumigate the yard with it.

4th. Sulphurous acid is made by burning sulphur. This is an easy matter. After all the senses must regulate the amount both for the cattle and those employed about them. Sulphur may be thrown on a shovel full of coals; or Mr. Stone's method for chlorine may be imitated, and crystals of sulphite of soda thrown into weak muriatic acid.

In revising this, I may add, it may be considered as proved that tar acids have a powerful effect in resisting the commencement of the disease. Even then, however, persons must be careful not to go direct from an infected animal to touch a sound one.

Conclusion to Part I.

I pretend to no knowledge such as is required of a man who treats disease. I speak as a chemist, and as a chemist drive forward, as far as seems to me rational, the chemical theory. Speaking of the cause of infection I treat it only as represented by a substance, with form, size, and other qualities. I do not pretend to be entirely ignorant that there are theories of disease quite inconsistent with this idea. But the department assigned to me is disinfection, and even if I could tell anything of the more mysterious, and perhaps principal causes, I would still think it wise to study the subject of this paper. It is only when these infectious agencies approach us that we can attack them; we cannot attack them in the sun, or the planets; and whether the cause be in the stars, or whether diseases migrate like mankind from Central Asia, or are thrown down in ready formed germs, like meteorites from space, or grow at our own unwashed back doors, the same destruction of the agent immediate to us must take place by cleansing, or some other mode of disinfecting. Mere cleanliness is all the disinfection wanted in ordinary cases, but when epidemics arise it is quite insufficient. If our theory is true, disinfection becomes then as needful as food.

It will be to our advantage to extend the use of disinfectants, and to study them more carefully. In most cases they have been used in the form of perfumes, and frequently to mask the odour of the unwashed; for such a purpose of course their use is detrimental and not innocent. All disinfectants may be viewed as medicine, and not as food. No man can breathe the vapours of any of these agents with such good effect as the pure air. They are more or less destructive of the chemical changes in organized bodies, including mankind. We have a fair hope of safety from the attacks of infected matter if it is destroyed by certain substances more readily than the living animal is destroyed. After a time it may be found that one body, say amylic alcohol, will destroy one disease, and cresylic alcohol another, whilst iodine will be required for a third. Here we make no such distinctions, but treat them, perhaps too violently, in a mass.

Hitherto, disinfection has been, and it still is, an obscure art, but I believe it destined to take a much higher place. The peculiar power, which I have called colytic, seems to point to an action by which the direction of the forces in compounds is changed, and may lead to some interesting scientific investigations.

I look on the abundant use of tar acids as a success for prevention, and am inclined to think that with strong animals, chlorine and two or three of the powerful gases might act as a cure when used as fumigators only—that being the readiest way. Chlorine must then be made stronger, by using muriatic acid and black oxide of manganese, or chloride of lime and muriatic acid.

At this point of my inquiry I found myself unable to proceed, because of other duties, and requested the Commission to seek the aid of Mr. Crookes, F.R.S., to finish the inquiry on the use of disinfectants, treating the animals themselves.

It might have been better if I had begun on the living animal at once; but I was anxious to build up the whole structure of disinfection by new experiments —too great a work, and I must leave the fragments for the present.

Note.—It has been supposed that I had an interest in McDougall's powder; my connection ceased before it brought any return. I never was partner. I had the pleasure of doing much with Mr. McDougall towards showing the use of carbolic acid, and my experience then gained caused me to be consulted in the present case. Mr. McDougall and I took different courses, and he has, I believe, done much good service; but he has not explained to me his other patents fully; they were taken out quite unknown to me, and his soap was first shown me by one of the Cattle Plague Commissioners. The soap seems to me to contain carbolic acid and soda; if so, I can say that it is a very excellent mixture. I am perfectly free and able to speak without bias on the subject.

PART II.

This part consists of a few experiments of which my notes are given, and some begun by Mr. Crookes.

After having given up to Mr. Crookes the subject of disinfection as applied to the cattle themselves, I found that I could by means of assistants carry out a few experiments that had been proposed, and for which Mr. Crookes would not be able to find time at first, although he has originated in the short time several methods of inquiry. He first collected the moisture of the air and the breath of the cows, and so on. Reasoning as I did, it seemed to me that chlorine was more suited to cure than carbolic acid was, although the latter was better fitted for prevention. It was needful to travel over a good deal of ground daily to obtain cattle. I shall not detail the experiments. There were no actual cures performed on sick cattle, although the stock became less affected where chlorine was used. Many of the cattle were better for a while, but the life seemed to sink before the disease could be attacked with sufficient power. Mr. Stone, of Manchester, has attended more to the use of this gas.

One of the first proposals I made was the use of oxygen gas, but, like many others, it has not proved practical. One difficulty is in compelling the cow to breathe it. I fixed a funnel over one nostril, and connected the end with a bag of the gas, which was kept under pressure. This is the only disinfectant which gave an instant relief to the cow. The breathing is very difficult and short, and is accompanied by a sound not unlike a grunt. With the use of oxygen for a few minutes this is remedied, and the breathing becomes calm, and pleasant apparently to the animal. I find it difficult and laborious to keep up the supply, and the carriage of such a bulky article as oxygen was not to be frequently undertaken. One cubic foot, however, had a great effect. Considering the circumstances, it does not seem possible to make oxygen in such abundance as to render it a useful agent in this plague. It is, however, right to record the facts here. I was expecting a different result. I expected an excitement which would have enabled the animal to triumph over some of the difficulties connected with its breathing. The breath was analyzed before and after oxygen, and the results are given below. Finding that a ready cure was not obtained, I tried the use of oxygen in the stomach, giving per-oxide of hydrogen. This was at least found to be no specific. Two cows were treated with above a quart. They seemed worse rather than better. A calf only slightly unwell was rapidly cured, in the opinion of the people around, but fell back in a day. When the disease has gone far the promise of advantage is not great, considering too the high price of the remedy.

When cows are violently purged, it is generally said that cure is hopeless. They are sometimes cured by the use of carbolic acid, a table-spoonful being added to some gruel.

Mr. Crookes brought me a microscopic slide, having on it a piece of glycerine, against which the air of an infected cowhouse had been directed for some time. It was examined by Mr. Dancer and myself with the aid of a high power, somewhat above 2,000. Specks and films were found upon it, but it was not possible for us to detect any known form, and there could not be expected to exist in such a state any active living things.

Mr. Crookes also brought me some cotton through which air from an infected place had passed. It was examined at the same time. Taking the cotton in mass nothing decided was seen; but when it was washed some of the separate films were coated over with small nearly round bodies, presenting no structure, or at least only feeble traces of it, and perhaps to be called cells. I had not sent gun-cotton, as I intended, to Mr. Crookes, fearing the rules of the post; otherwise there would have been more certainty that the bodies spoken of did not exist previously on the cotton. However, Mr. Dancer, who has examined cotton with the microscope oftener than most persons, even of those experienced in the subject, had never observed a similar appearance.

The liquid had also a number of similar bodies floating in it.

It was then that Mr. Crookes sent a liquid which he had condensed from the air of an infected cowshed at a space a little above the head of a diseased cow. It was also examined, and it presented similar indications of very numerous small bodies. Not being a professed microscopist I shall not attempt a description, but add that they clearly belonged to the organic world, and were not in all cases mere debris. We found also one body a good deal larger than the rest; it resembled somewhat a paramecium, although clearly not one.

We found no motion whatever, and only this latter substance could be adduced as an absolute proof of anything organized being present. Next day I examined the same liquid; and, whether from the fact of time being given for development or from other causes, there was a very abundant motion. There were at least six specimens in the field at a time, of a body resembling the euglena, although smaller than I have seen it. When these minute bodies occur it is clear that more may exist, and germs in this early stage are too indefinite to be described. The existence of vital sparks in the organic substances in the air alluded to is all I wish to assert, confirming by a different method the observations of others. It might, of course, be said that since the bottle was opened at Mr. Dancer's the air at that place may have communicated them. I answer that, before it was opened, a good glass could detect floating matter, some of it, however, as the microscope proved, indefinite enough.

Finding this, and fearing that the long time needful to collect liquid from the atmosphere might expose it also to much dust, I used a bottle of about 100 cubic inches dimensions, and putting with it a very little water, not above five cub. centimetres, I pumped out the air of the bottle, allowing the air of the place to enter. This was done six times for each sample, the water shaken each time, and the result examined. This was done with the same bottle that was used in my early experiments with permanganate, and by the same method, except that water instead of that salt was used. At first considerable numbers of moving particles were found; but it was needful to examine the water used, and here occurred a difficulty. It was not until we had carefully treated with chemicals and then distilled the water again and again that we could trust it. Particles seem to rise with the vapour, and if so why not with the evaporating water of impure places.

Having kept an assistant at the work for a week, and having myself examined the air of three cowhouses, I came to the conclusion that the air of cowhouses and stables is to be recognised as containing more particles than the air of the street in which my laboratory is, and of the room in which I sit, and that it contains minute bodies, which sometimes move, if not at first, yet after a time, even if the bottle has not been opened in the interval. There is found in reality a considerable mass of debris with hairs or fine fibres, which even the eye, or at least a good pocket lens, can detect. After making about two dozen trials, we have not been able to obtain it otherwise. Even in the quiet office at the laboratory there seemed some indications.

I found similar indications in a cowhouse with healthy cows; so I do not pretend to have distinguished the poison of Cattle Plague in these forms; but it is clear that where these exist there may be room for any ferment or fomites of disease; and I do not doubt that one class is the poison itself in its earliest stage. It would be interesting to develope it farther.

I have recorded elsewhere that I condensed the

Dr. Angus Smith. Report to Commissioners.

liquid from the air of a flower garden, and found in it, or imagined I found, the smell of flowers. I do not remember that I looked much to the solid or floating particles, thinking them to be blown from the ground, but it does not affect the result, whether they be found constantly in the air or are raised by the action of currents.

Mr. Crookes, when pursuing his inquiries in Yorkshire and Cheshire, collected specimens of cows' breath. He has already described his mode of taking them. I believe he brought seven, and as in inquiries on the air of mines I had always been accustomed first to use the microscope, this was the course taken. Finding that in nearly all cases there was much moisture, and that nothing could be seen without very high powers, the use of which the thick glass did not permit, I cut the tubes open with a diamond, and examined the liquid and deposit within. In this examination I was not successful in finding anything remarkable. The tubes have always some impurity in them; dust from the workshops. Having examined about 400 of them on a previous occasion, I knew what to expect. There was on one of these tubes sent by Mr. Crookes a branching crystal, but it did not appear after a day or two. Probably a rise in temperature had evaporated or dissolved it.

Not wishing to destroy more tubes, the air within was examined for carbonic acid and oxygen, when the amounts were found to be nearly as in common air.

This showed that it would be needful to examine the breath of a healthy cow, when it was found to contain a considerable amount of carbonic acid.

Finding this, it seemed needful to examine further, and to see that the mode of taking the breath was in all cases the same, and done by the same person. Mr. Hartley, my assistant, put a funnel over the nostril of the cow; to the funnel was attached a strong caoutchouc tube, with a slit cut longitudinally. This acted as a valve. When the cow inhaled, the valve shut, and so no fresh air could enter the tube; but when it exhaled some of the breath went through the opening, and some forward to the collecting tube. The breath came out in gusts, which prevented much mixture of air; but even by this mode it was only by averages that we could obtain certainty. Still it will be seen that the breaths of the diseased cows contain uniformly a very small amount of carbonic acid.

The blood does not appear to take up the oxygen supplied to it in its usual amount. The consequence is, that there is a demand for more oxygen. This may cause the quick snorting breath. This may also be the reason why pure oxygen calms the breathing. It was expected that the amount of carbonic acid would increase by the use of oxygen. It will be seen that there was a slight increase even after inhaling only a cubic foot of oxygen, of which at least we may calculate one half as lost.

Carbonic acid and oxygen in the breath of cows.

Breath of diseased Cows.

Specimens.	Carbonic Acid.	Oxygen.	Nitrogen.
Sent by Mr. Crookes	0·15	20·63	79·22
	—	20·54	79·46
From Mr. Holland's farm at Mobberley, Cheshire	1·25	19·26	79·49
	0·62	20·13	79·25
	0·52	20·56	78·95
	0·76	20·28	78·96
	0·57	20·28	79·15
	0·54	20·19	79·27
	0·41	20·44	79·15
	0·60	20·48	78·92
1st day of distinct disease	1·49	19·60	78·91
2d " "	1·13	19·79	79·08
3d " "	0·83	20·28	78·89
4th " "	1·42	19·62	78·96

In this last case a rise of carbonic acid is found, and must be accounted for if possible.

Before oxygen was inhaled.

Carbonic Acid.	Oxygen.	Nitrogen.
0·41	20·44	79·15
0·60	20·48	78·92

After oxygen was inhaled.

Carbonic Acid.	Oxygen.	Nitrogen.
0·57	20·28	79·13
0·66	20·25	79·09

We must compare these results with the averages of—

Breath from healthy cows.

Carbonic Acid.	Oxygen.	Nitrogen.
3·09	17·86	79·05
2·66	18·52	78·81
1·91	19·02	79·07
0·80	20·28	78·92
1·37	19·51	79·12
1·32	19·49	79·19
0·77	20·01	79·22

There seems a little falling off in carbonic acid in some cases. All these cattle were exposed to disease, and some may have had it unknown to us. The results are remarkable; but this, like every other part of these notes, only shows where interesting inquiries lie and no more.

It is probable that nature, to make up for the want of oxidation, increases the number of respirations. There seems also another provision made. Gas collects under the skin, and sometimes to a great extent. It was examined, and found to contain

	Carbonic Acid.	Oxygen.	Nitrogen.
From the hind leg	11·78	3·51	84·71
Neck	11·64	5·77	82·59
Neck	13·00	3·91	83·09

with traces of hydrocarbons.

This result shows oxygen to be absorbed without an equivalent of carbonic acid being given out. There might be putrefaction here as hydrocarbons show themselves, and nitrogen may be supposed to be eliminated. Many ideas will follow on this. I shall only remark, that here work is doing which the lungs have neglected to do.

I may give in addition here the analyses of air from a cowshed, the first being sent by Mr. Crookes.

	Carbonic Acid.	Oxygen.	Nitrogen.
Taken 2 feet from ground, 3 cows ill	0·18	20·87	78·95
From Mobberley	0·08	20·79	79·13
	0·34	20·55	79·11
	0·37	20·52	79·11
Previous analyses, 1863	—	20·70	—
	—	20·78	—
	—	20·75	—
Stables, 1863	—	20·82	—
	—	20·74	—
	—	20·74	—

I would continue the subject, but as the volume is to be published I think it well to let these experiments be entered as part of an inquiry, confirming, it is believed, views given.

R. Angus Smith.

Note.—My proposal for examining all the cases of disinfection within a large circuit, reporting on each, and taking the average number of successes of various plans, not being agreed to, I may here give my reasons for it. I found that disinfectants were used, and I may say they are still used, as amulets. A court of several thousand feet, with cowhouses adjoining, has been supposed to be disinfected by the use of a piece of canvass 10 inches square, dipped in carbolic acid, and hung on a wall. A cowhouse which I visited is treated by a cross marked on the wall in tar at the head of the cow. Such are some cases where disinfection has failed to produce an effect. The same with chlorine. A bottle is set in a corner, but no one can smell the gas.

Mr. Higgin of Mobberley has had entire immunity from the plague with the daily internal administration of sulphite of soda; whilst a neighbour considers that it produces weakness, a result not observed on Mr. Higgin's cattle.

I am told by Mr. Lowe of Manchester of cases where contact produced disease in a shed of healthy cows treated with carbolic acid; whereas the air had no bad effect on the others. The case was this:—a man who had been in an infected cowhouse came into a shed and touched one of the healthy cows; it became ill; none of the others became ill. This would indicate the extent to which carbolic acid could be relied on, and protection so far is a great deal.

On the Application of Disinfectants in arresting the Spread of the Cattle Plague.

REPORT TO HER MAJESTY'S COMMISSIONERS,

BY

WILLIAM CROOKES, F.R.S.

PART I.

THEORETICAL CONSIDERATIONS AS TO THE PROPAGATION OF THE CATTLE PLAGUE.

1. Previous to my receiving instructions from the Royal Commission for inquiring into the origin and nature of the Cattle Plague, I had devoted considerable attention to the investigation of the applicability of disinfectants to the prevention or cure of this pestilence, ever since its first appearance in England, and had tried numerous experiments both in the laboratory and also on a large scale in farmyards. I was therefore not unprepared to commence at once the practical operations which it was considered desirable to carry out.

2. As to the bare fact of the infectious* nature of the Cattle Plague all are agreed. That contamination of some kind is communicated from a diseased to a healthy animal is obvious to every one; but when we inquire by what agency the disease is carried, the answers are of the most conflicting kind. Something, evidently a material substance, passes from one beast to another; but what is this something? Is it a solid, a liquid, or a gas; living or dead; an animal or a vegetable germ; a poison, virus, or ferment? Each of these views has found advocates, and in favour of each something may be said.

3. There are weighty reasons for deciding that the infecting matter is neither a gas, nor even a volatile liquid. The almost infinite attenuation which a gas undergoes owing to its rapid diffusion into the atmosphere, would render its supposed noxious influence imperceptible a few yards from the focus of infection. Moreover, the infection is capable of being carried considerable distances in clothing or running water, and in a variety of ways incompatible with the behaviour of gases. For these reasons, and many others unnecessary to adduce here, it seems clear that the disease must be communicated by the agency of solid, non-volatile particles.

4. The specific disease-producing particles must moreover be organized, and possess vitality; they must partake of the nature of *virus* rather than of *poison*.† No poison yet known to chemists can approach, even in a faint degree, the tremendous energy of the active agent of infectious diseases. A poison may be organic, but it is not organized. It may kill with far greater rapidity than the virus of infection, but, unlike this virus, it cannot multiply itself in the animal economy to such an extent as to endow within a few hours every portion of its juices with the power of producing similar results. A virus, on the contrary, renders the liquids of an infected animal as virulent as the original germ. Strychnine may be regarded as the type of a poison, and vaccine matter as the type of a virus.

5. Many considerations tend to show that the virus of Cattle Plague is a body similar to vaccine lymph, and consists of germinal matter, or living cells, possessing physiological individuality, which if not exposed to extremes of heat, cold, or dryness, are capable of preserving their activity for a certain time outside the living organism, of adhering to material objects, and of being carried from one place to another by currents of air; each, when introduced into the blood, requires a certain time (known as the period of incubation) during which the septic germs develope and multiply, until they have so far poisoned the blood that the ordinary symptoms of disease become manifest.

The blood poisoning thus set up may legitimately be called "fermentation;" it is a decomposition caused by the act of nutrition of the living cell, whereby it reproduces in incalculable numbers the specific septic germs which have given it birth. These gradually infest the blood and other animal liquids, and as the disease progresses are discharged from the skin, throat, glands, &c.; the breath, perspiration, and excreta of the animals forming vehicles for the distribution of the virus. By "living" cells, is not meant living, in the sense in which an animal, or even a low form of infusoria lives; but living as a seed, or as vaccine matter, even when dried, may be living, inasmuch as it still possesses reproductive vitality.

6. It is by no means certain that the multiplication of these individual cells is the immediate cause of the blood poisoning. The analogy of the action of virus on the blood, to that of yeast on sugar, renders it more probable that this is not the fact. In the case of the best known ferment—yeast—its cells multiply by feeding upon the sugar in the liquid; alcohol and carbonic acid being their excretions. It is therefore probable that during the multiplication of the virus cells, they, in a similar manner, impoverish and weaken the blood, by feeding upon some element in it, whilst at the same time they excrete a poison to which the symptoms of the disease may be immediately due.

7. The foregoing view differs from the prevalent notion that the virus of contagion consists of decomposing organic matter, declining from a complex towards a more simple chemical constitution, and during its degradation inducing decomposition in the neighbouring particles of matter. This chemical theory at first sight appears very plausible; but it fails to satisfy one necessary condition of the present case. It is possible to imagine that the force set free in the declension of a complex chemical molecule to a more simple form will be sufficient to raise a neighbouring molecule to a structure almost as complicated as the original; but according to this view the ferment would be constantly diminishing, whereas in reality it constantly increases in bulk. The hypothesis is therefore insufficient to explain the prodigious procreative power of the original particle. This power belongs only to the nature of an organized germ, capable of producing multiples of itself by a process of nutrition and subdivision. Thus the line of demarcation between organic poison and organized virus appears to be very clearly defined.

This necessarily brief outline of the theoretical views which have governed me in the present investigation will, it is hoped, be clearer and more intelligible after perusing the experimental proofs which follow. They have been corroborated by numerous small laboratory experiments, as well as by practical operations at different farm houses.

8. Whether this theory thus briefly sketched be adopted or not, or whether it be regarded as a provisional scientific artifice, it certainly includes and explains a far greater number of the phenomena of pestilence than any other hitherto propounded. Moreover, it is the theory sanctioned by the most influential of those medical philosophers who have the best right

* I have throughout this report used the word "infectious" in preference to "contagious." The limitation to actual contact involved in the word *contagious*, and the popular opinions which the use of these words foster, that some diseases are infectious and not contagious, whilst others may be contagious though not infectious, imply a far more profound knowledge of the way in which diseases are transmitted than we yet possess. I therefore prefer the wider term infectious, as being more applicable to our present knowledge on the subject.

† The words *virus* and *poison* are generally regarded as synonymous. It would be more convenient, and would tend to promote accuracy of thought, were the distinction here made, generally adopted.

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to be heard on this subject, and notably by the distinguished Registrar-General, Dr. Farr, who by the adoption of the word zymotic, in his classification of diseases, has implied his adhesion to this theory.

9. Bearing upon the communicability of this disease are other questions, which hitherto have not received a a satisfactory settlement. How does the virus travel? What amount of resistance to ordinary conditions of moisture and time does its vitality confer upon it? Will it propagate and multiply, outside the animal body, under favourable conditions of warmth and moisture? And can we find any chemical disinfectant or antiseptic which will readily destroy it?

The extreme communicability of the pestilence may arise either from the eminently diffusible character of the virus-cells, or from their persistent vitality, or from both conditions combined. It is proved that the *materies morbi* will adhere to clothing, and can be carried a considerable distance in it; that the breath, perspiration, and evacuations of the diseased animal are loaded with virus-cells; and that the secretions from the mouth, nose, and eyes are in a similar condition. It follows, therefore, that the sheds, in which diseased animals have stood, become impregnated with the virus, ready to settle on the clothes of every one who enters; that ponds, streams, and even wells may become contaminated through foul soakage; that a road, over which diseased cattle have been driven, may be poisoned along its whole distance by the evacuations and other discharges from the animals; whilst their very breath, carried by the wind, may plant the seeds of infection in all the healthy farms by which the road passes.

There is no difficulty in admitting that the infection may travel for a certain limited distance through the air, and it is even likely that it may be carried longer distances by fogs, or heavy vapours, or by the gases of putrid decomposition; but it appears in the highest degree improbable that the germs should be able to retain their vitality for any length of time in the atmosphere.

10. Sufficient data do not at present exist to decide whether the germs can propagate themselves apart from the animal. Viewing them as of the nature of a ferment, it is not impossible that they may live and multiply in other warm liquids besides the blood; but the most reasonable supposition seems to be that the presence of decaying organic matter, or the gaseous emanations from putrefying dunghills, preserves, or may even revive, the expiring vitality of germs brought by men, dogs, birds, vermin, or perhaps the wind; whilst the same causes which foster the virus-cells,—dirt, overcrowding, constant rebreathing of their own and the adjacent animals' breath, an insufficient supply of fresh air, the presence of ammonia and other gases of putrefaction, together with inappropriate food,—may establish a deteriorated state of body, which causes the animals to fall ready victims at the first approach of the plague.

The existence of these unfavourable conditions may account for the fact that on some farms the disease assumes a character so virulent that no remedy or preservative is of any avail against it, every head of cattle being swept off one after another, each attack being fatal within three days (15. 79. 80). In the words of a writer in the Edinburgh Review, "a single "spark of infected matter accidentally thrown into the "animal economy, thus reduced as it were to a touch-"wood state, fires the mass, which burns until it is "consumed."

PART II.

On Disinfectants generally.

11. There appears as yet but faint hope of finding a cure for the disease, and even were medical science to supply that great boon, it would be of little use unless supplemented with vigorous disinfecting measures; otherwise it would be like attempting to put out a fire, fed on all sides with inflammable materials. Disinfection must, therefore, be the first consideration, and should be carried as far as possible short of endangering the health of the sound animals by the agents employed. Disinfectants and antiseptics have necessarily a powerful action on vital phenomena; and in some cases it may happen that an animal's vital powers are so diminished by the disease that it will not have strength left to bear the remedial treatment; but even in this case less harm will be done by its use than if the animal had been allowed to die of Cattle Plague.

12. Disinfection, in the widest sense of the term, includes deodorization, and means the neutralization or destruction of all substances, arising from putrefying organic matter, or emanating from diseased animals, either injurious to health or offensive to the sense of smell.

The putrefactive products of animal and vegetable matter are found to consist of some or all of the following gases and vapours:—

- Sulphuretted hydrogen,
- Phosphuretted hydrogen,
- Ammonia,
- Phosphorus- and nitrogen-bases of complex constitution,
- Acetic, butyric, valerianic, &c., acids,
- Carburetted hydrogen,
- Hydrogen,
- Carbonic oxide,
- Carbonic acid,
- Nitrogen,
- Various organized animal and vegetable products of little or no activity, and
- The special virus of infection. (The latter in an infected district.)

13. In a more restricted sense, the term "disinfectants" is used to express those agents which destroy organic or offensive matter by oxidation or analogous action; whilst under the term "antiseptics" are classed those agents which prevent chemical change by destroying the tendency to putrefy. The latter are termed, by Dr. Angus Smith, colytics, from κωλύω, I arrest.

14. Oxidizing disinfectants are by far the best known and most popular, inasmuch as they appeal directly to popular prejudice, by destroying the foul odours which are the usual accompaniments of infection, whilst antiseptics have little or no action on these gases. I hope to succeed in showing that this fallacious mode of estimating the relative value of disinfectants and antiseptics, is one which does great injustice to the latter.

15. Cleanliness, ventilation, and good drainage have been spoken of as comprising all that is required to preserve cattle from the plague. This is not correct. Due attention to these points will certainly tend to preserve the animals in better health, and will render them more fitted to sustain the exhausting action of the disease; but ventilation, cleanliness, and drainage are unavailing against the importation of the germs of disease from adjacent herds. These measures are of value as they remove what might otherwise become nurseries for infection. A germ from without, falling on to a clean dry stall, is likely soon to die; but if it meet with moisture and dirt, its vitality may be fostered, and the chance of its coming in contact with a healthy animal so much the more increased (10.). Cleanliness, drainage, and ventilation, are admirable adjuncts to disinfection, but it is not safe to trust to them alone to ward off the plague. Ventilation, by allowing a greater number of cubic feet of air per minute to pass over the animals, may be in fact the means of conveying the infection to them. A moderately ventilated shed, in which antiseptics are freely employed, has been proved to be a place far safer for cattle, than an open field; although when the animals have caught the disease, the mortality appears to be less when they are turned out into an open field than when they are kept in sheds.

16. Dr. Angus Smith, by his exhaustive examination of disinfectants, has rendered it unnecessary for me to search amongst the numerous class of possibly useful bodies for those likely to be of practical value. His results I accept in the full conviction that they are correct; and I proceed to investigate the respective merits of the comparatively small number of agents available for disinfection.

17. At the outset it is necessary to strike off at once a whole class of valuable agents, which will not meet the requirements of the case. It appears to have been satisfactorily proved that the infectious matter passes off mainly from the lungs of diseased animals, and that it attacks healthy ones through the same channel. It is suspended in the air with fogs, vapour, and gaseous products of decomposition, settling on rafters and in crevices whence mechanical purification would be unlikely to dislodge it. Partaking in this manner of the physical properties of a vapour, or of fine dust, it is clearly hopeless to attempt to combat the virus by non-volatile solid or liquid disinfectants.

18. For this reason charcoal, chloride of zinc (Sir William Burnett's disinfecting fluid), solutions of metallic salts, and other similar substances are of very limited use. Moreover, chloride of zinc (and this is probably true of the other metallic chlorides) has been proved to possess no efficacy in destroying specific infective emanations. What is wanted is a volatile and liquid disinfectant, which after first acting on the excreta, the floors, walls, and stalls of the shed, will, by its quality of gaseous diffusion, rise into the air, enter the lungs of the animals, pervade the whole building, and attack the hidden germs of infection, which otherwise would escape. In addition to this the agent must do its work with as little inconvenience as possible to the cattle and their attendants.

19. Some disinfectants, however suitable in other respects, are too expensive, unsafe, or injurious to health, to be used : such are bromine, iodine, per-oxide of hydrogen, hypo-nitric acid, and hypo-nitrous acid.

20. The value of excessive heat as a disinfectant is very great, but it is available only in a limited number of cases. It acts in two ways. Heat, to the boiling point of water, continued for half an hour or more, acts as an antiseptic, perfectly destroying the vitality of all germs of contagion, or virus cells. In this way clothing and similar substances are conveniently disinfected. Heat, pushed to destruction in the presence of air, acts as a disinfectant, by promoting oxidation. The disinfecting value of the combustion of infected substances is too well known to require further notice.

21. Hydrochloric acid gas (evolved from salt and oil of vitriol) is most irritating to the respiratory organs, and is very inferior in its action to both sulphurous acid and chlorine. Besides, when evolved in whitewashed sheds, it unites with the lime on the walls, forming a highly deliquescent compound, chloride of calcium, which keeps them permanently damp. The employment of a dangerously corrosive body like oil of vitriol should also be avoided.

22. Oil of tar can also be removed from the list, its value entirely depending upon the small amount of the tar acids it contains (34.). To the same class petroleum belongs. This body has been used with considerable success in Wallachia by M. Étienne R. Veron, who in an interesting pamphlet, which he has taken great pains to draw up, and forward to this country, (in the hope that it may prove as useful here as it has been on his estate,) has given full details of the means he employed to extinguish (*étouffer*) the disease, and then keep it from his farms, in 1864.

Every animal which showed the least signs of disease was at once killed. He then caused all parts of the sheds, which could have been in contact with the animals, to be washed with petroleum, and the bodies of the cattle were afterwards rubbed over with a cloth soaked in the same material. The farm servants had orders to wash their hands, boots, &c., in a mixture of petroleum and water, and to sprinkle their clothes with the mixture, whilst a little petroleum was added to the animals' food and drink. Their excrements were frequently removed, and the floor sprinkled with petroleum. No dogs were admitted on any pretence.

For five days these precautions were rigidly observed, when they were somewhat relaxed. They were attended with complete success, and there is little doubt that, carried out as rigidly in this country, the same good results would ensue. A copy of M. Veron's pamphlet was forwarded to me, and many experiments have been made in consequence. Petroleum depends for its value upon a small quantity (1 or 2 per cent.) of either carbolic acid, or a substance allied to it, and Dr. Angus Smith has shown that when this substance is removed by appropriate means, the purified petroleum has no antiseptic value. This being the case, no experiments on the large scale were tried with petroleum, as they would necessarily be similar, but inferior in their results, to those of the tar acids.

23. The choice is therefore limited to the oxidizing disinfectants—chlorine and ozone, and the antiseptics —sulphurous and the tar acids. These are representative bodies, and numerous trials have been made with them before coming to a conclusion as to their respective merits; the results being embodied in the following pages.

24. I am bound to admit that the conclusion to which I have been forced to come, is quite opposed to my preconceived ideas on the subject. I started with a strong bias in favour of chlorine and ozone, but the irresistible force of the arguments derived from my experiments has caused me to alter my opinion.

Oxidizing Disinfectants.

25. At first sight nothing appears more perfect than the action of a powerfully oxidizing disinfectant, like chlorine or ozone, upon noxious vapours and septic germs. In presence of an excess of either of these agents, all organic impurity is at once burnt up, and reduced to its simplest combinations ; and could we always rely upon the presence of a sufficient amount of either of these bodies, no other purifier would be needed. But in practical work on a farm these disinfectants are always very inadequate, except perhaps for half an hour or so during the day; at other times, the oxidizing agent has presented to it far more noxious material than it can by possibility conquer, and being governed in its combinations by definite laws of chemical affinity, the sulphuretted and carburetted hydrogen, the nitrogen- and phosphorus-bases, &c., would all have to be burnt up before the oxidizing agent could touch the germs of infection ; whilst the continued renewal of the gases of putrefaction, would be perpetually shielding the infectious matter from destruction.

It is here that the great objection lies to disinfectants which act by oxidation. If we arrange in a series, (as set forth in par. 12,) the possible substances which may be met with in an infected shed, and gradually mix with them chlorine or ozonized air, we find that those vapours having strong and fœtid odours, and which stand at the commencement of the list, are the first to go; whilst the actual virus of the disease—the organized particles which have no odour whatever—are the last to be attacked. But in using disinfectants of this class, the only test of efficiency which a workman would employ, is the sense of smell, and I have on several occasions known it happen that a deodorised shed, to all outward appearances disinfected, was still in reality saturated with infection. It so happens, that the stinking gases of decomposition are of little or no danger in the atmosphere, whilst the deadly virus-cells of infectious diseases are inappreciable to the sense of smell. Mere deodorisation is therefore no protection whatever.

The following experiment tends to illustrate, if not to prove this: Cheese mites were put into water mixed with strongly smelling cheese and sulphuretted hydrogen. Aqueous solution of chlorine was gradually dropped into the mixture from a burette. The smell of sulphuretted hydrogen was the first to go, then some smell of cheese, but it required a considerable quantity of chlorine to kill the mites. Exactly the same experiment was now repeated, only leaving out the sulphuretted hydrogen and cheese. The chlorine now had nothing to divert its energy from the cheese mites, which were consequently killed before one fourth the quantity of chlorine used in the first instance had been added.

Again, oxidizing disinfectants possess little if any continuous action. What they attack is destroyed perfectly, but what they leave has no special resistance to decomposition conferred upon it. They remove the products of decomposition, but they do not take away the power of further putrefaction.

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In addition to these general faults possessed by oxidizing disinfectants, the following special objections may be urged against chlorine and ozone.

26. *Chlorine.*—This agent requires to be liberated in the gaseous state by a chemical process. This at the outset is an objection, for experience shows that farm labourers are not fit persons to be trusted with the performance of a chemical experiment involving the use of corrosive acids. The smell of chlorine is very irritating to the lungs of diseased or convalescent animals; and instances have come to my knowledge in which permanent injury has resulted from its employment. Moreover the cattle dislike it much. Its action is more energetic upon the valuable constituents of the manure than upon septic germs*: it rapidly attacks ammoniacal compounds, the urea and hippuric acid, and considerably reduces the manurial value of farm-yard stuff. If much ammonia is present in the shed, chloride of nitrogen is likely to be formed, the vapour of which, even in minute quantities, is painfully distressing to the eyes of cattle and their attendants. Another great objection is that gaseous chlorine, being absorbed by the whitewash, soon forms chloride of calcium (21. 28.), the deliquescence of which will make the walls of the building permanently damp, and fitted to foster the vitality of virus-cells, should they fall upon them.

27. A plan of fumigation by chlorine has recently been recommended which appears to possess another disadvantage. It is based upon the decomposition of chlorate of potash by hydrochloric acid. This reaction does not evolve pure chlorine, but a gas called euchlorine (supposed to be a mixture of chlorine and chloric oxide). The properties of this gas are different from those of chlorine, and nothing is known about its special value as a disinfectant. It is dangerously explosive, the act of transferring it from one vessel to another, or even the warmth of the hand, being sometimes sufficient to shatter the vessel to pieces with a loud report.

28. If commercial chloride of lime is used as the source of chlorine, there is the additional disadvantage that the compound into which it changes—chloride of calcium—is, as before-mentioned (21. 26.), very deliquescent, and will leave the floors, walls, and especially the woodwork washed with it, permanently damp; whilst, if thrown in the solid state on the floor, it rapidly attracts moisture, and becomes unpleasantly wet. It also communicates a disagreeable odour to the hands when it is touched. It is one of the things most easily adulterated, and it would be scarcely possible to supply an ordinary consumer with a test, by which he could ascertain its strength and purity.

29. *Ozone.*—This powerful agent attacks all kinds of organic matter with intense energy. But as in the case of chlorine, the specific substance which we most want to destroy, would be nearly the last to go; and, as it would be almost impossible to generate ozone in quantity in an infected shed, its energies would in most cases be spent in doing useless work. When much ozone is present in the air it acts hurtfully on the respiratory organs.

Owing to the extremely poisonous nature of phosphorus, and its ready inflammability, danger would arise from the production of ozone by the slow combustion of this element. In the hands of ordinary farm servants serious accidents from fire would be constantly occurring.

Antiseptics.

30. Oxidizing disinfectants produce their effect by actually destroying infecting substances. Antiseptics act simply by destroying their activity. The former act more energetically upon dead than living organic matter. Antiseptics attack first the opposite end of the scale, and destroy vitality; they exert little or no action on the foul smelling and comparatively harmless gases of decomposition, but they act with intense energy on the inodorous germs of infection which these gases may carry into the atmosphere along with them.

If, therefore, the theory with which I started be correct; if the matter which conveys infection from one animal to another be of the nature of an organized germ; if it owe its tremendous powers of destruction to the presence in it of vitality,—then antiseptics are the only agents fitted to deal with this special case; for they leave almost untouched the crowd of simply odorous gases, and seek out and destroy the one thing to be feared. When I treat of carbolic acid, ample proof of the correctness of this view will be given.

31. *Sulphur Fumigation.*—Of all disinfecting processes, this is, perhaps, the oldest. Its action was well known in the days of Homer, for we read that Ulysses employed it to remove the smell of dead bodies.* It is recorded by Ovid† that the shepherds of Italy yearly purified their flocks and herds with burning sulphur, and passages in other writers show that they averted disease from them by this means.

Professor Graham, Master of the Mint, says, that of gaseous disinfectants "sulphurous acid gas (obtained "by burning sulphur) is preferable, on theoretical "grounds, to chlorine. No agent checks so effectually "the first development of animal and vegetable life. "All animal odours and emanations are immediately "and most effectually destroyed by it."

The value of sulphurous acid in arresting the progress of the Cattle Plague, has been proved beyond a doubt by the experiments of Dr. Dewar, and my own results entirely confirm his. When, however, used by itself, it can be employed only very sparingly in sheds, when cattle are in them; it is very stifling, and its powerful deoxidizing action would retard the conversion of the peroxide of iron into protoxide by the act of respiration—a result equivalent to that produced by breathing an atmosphere containing less than its normal amount of oxygen, which has been shown by Dr. Angus Smith‡ to be incompatible with health. For this reason I prefer to use it only as an additional precaution, relying principally upon other agents. Sulphurous acid acts in many cases through its affinity for oxygen, but it possesses also great antiseptic powers of its own, so that a slight exposure to it is sufficient to destroy the vitality of germs. The following experiment proves this:—

A mixture of sugar syrup and yeast was kept in a warm room until it became in a state of active fermentation. An aqueous solution of sulphurous acid was added, when the fermentation instantly ceased. When examined under the microscope after treatment with sulphurous acid, no apparent change was observed in the appearance of the yeast cells.

32. When sulphurous acid is produced in a whitewashed shed, it unites with the lime on the walls, forming non-deliquescent sulphite of lime, one of the

* I find it recorded in the "Medical Record" for March 15th 1866, that Dr. J. P. Loines, of New York, as the result of a series of experiments, has come to the conclusion that chlorine, in quantity sufficient to be irrespirable, has no effect upon the infecting property of the vaccine crust; and, reasoning from this analogy, he is of opinion that the same is the case with the virus of variola.

* *Hom. Od.*, XXII., 481.

Ulysses. Οἶσε θέειον, γρηῦ, κακῶν ἄκος, οἶσε δέ μοι πῦρ,
Ὄφρα θεειώσω μέγαρον . . . . .
493. Ἤνεγκεν δ' ἄρα πῦρ καὶ θήϊον· αὐτὰρ Ὀδυσσεὺς
Ἐῦ διεθείωσεν μέγαρον καὶ δῶμα καὶ αὐλήν.

O old woman bring brimstone, the relief of evils, and bring me fire, in order that I may fumigate with brimstone the house . . . .
And then she brought fire and brimstone, and Ulysses well fumigated with brimstone the house and the court, and the hall.

† *Ovid, Fast.*, IV., 735, &c.

Pastor, oves saturas ad prima crepuscula lustra.
Uda prius spargat, virgaque verrat humum.
Frondibus, et fixis decorentur ovilia ramis;
Et tegat ornatas longa corona fores.
Cærulei fiant vivo de sulfure fumi;
Tactaque fumanti sulfure balet ovis.

O shepherd purify the fruitful sheep at the earliest dawn; let the moist bough first sprinkle and sweep the ground. Let the sheepfolds be decorated with foliage and boughs fixed, and let a lengthy wreath ornament the doors. Let there be blue smoke of burning sulphur, and let the sheep bleat at being touched with the sulphur.

‡ "Report on the Air of Mines," by R. Angus Smith, Ph. D., F.R.S., being part of the Appendix to the Report of the Royal Mines Commission, London, 1864.

valuable ingredients in McDougall's disinfecting powder; its good effect therefore does not cease as soon as the atmosphere is free from its odour.

The gaseous acid has a great affinity for water; the natural moisture always present in clothing, or on the wood-work and other parts of cowsheds most likely to retain infection, is able to absorb the gas in quantity sufficient to form a solution in contact with which virus-cells cannot exist. When absorbed in this manner it is only very slowly evolved,—a fact which has been noticed by all who have been in sheds whilst undergoing this mode of purification,—the fumes of the burning sulphur being said to "hang about" the clothes for a considerable time. Articles of clothing, boots, tools, sacks, cloths, baskets, pails, ropes, and any other portable article which may require disinfection, are conveniently purified by allowing them to remain in a close shed whilst it is undergoing sulphur fumigation.

Sulphurous acid, in addition to its antiseptic qualities, is a deodoriser of considerable energy. It destroys the powerful odour of most of the offensive gases named in paragraph 12. It attacks and oxidizes sulphuretted hydrogen, entirely destroying it; it neutralizes the strong smell of ammonia and other alkaline bases, converting them into sulphites, but without destroying their manurial value or losing its antiseptic properties. In this respect it differs in an important manner from chlorine.

The use of sulphurous acid is open to one or two objections. When absorbed on clothing or damp wood-work, it gradually oxidizes into sulphuric acid. In cowsheds this is not of much consequence, as there is always sufficient ammonia present to neutralize it; but if repeatedly formed on clothing, it will bleach the articles, and ultimately make them rotten. When neutralised with lime or ammonia, or other bases, the antiseptic value of the sulphurous acid is not impaired, but it is tied down to one spot, and prevented from acting in the atmosphere. When the sulphites thus formed are allowed to remain in contact with wet organic matter, they gradually decompose with evolution of sulphuretted hydrogen; but this decomposition is stopped at once by an additional fumigation with sulphur, and if the sheds are cleaned out every day it will never occur. Sulphites have been used with success by Professor Polli and Dr. De Ricci, both as prophylactics, and as curative agents, in diseases caused by blood poisoning: in Dr. De Ricci's words they neutralise the zymotic principle—the ferment—without being injurious to life.

33. *The Tar Acids* (*carbolic and cresylic acids*).—These two bodies are so commonly known under the name of acids, that I shall continue so to designate them, although by chemists they are more generally classed with the alcohols. They have great similarity, and only within the last few months have they been met with separately in commerce, having hitherto been both called carbolic acid. Creosote, (κρέας σώζειν, to preserve flesh,) prepared from coal tar, one of the most powerful antiseptics known, was thought to be impure carbolic acid, until 1854, when Professor Williamson and Mr. Fairlie, in an investigation of it, discovered that it was a mixture of carbolic and cresylic acids. It was then taken for granted that Reichenbach's creosote, from wood tar, had a similar composition, until Hlasiwetz, in 1858, showed that this creosote was a different body from carbolic or cresylic acids. Finally Dr. Hugo Müller, in 1864, discovered that true creosote, and its analogue guaiacol, belonged to a different class of bodies, and consisted of methyl-oxy-phenic and methyl-oxy-cresylic acids. No experiments on the large scale have yet been tried with true creosote, as I have only been aware within the last few weeks that this compound could be obtained in quantity.

Pure carbolic acid is a white crystalline solid, melting at 34° C. and distilling at 180° C.; a trace of water or oily impurity renders it liquid, and for disinfecting purposes it is always supplied in this form, to avoid the extra expense and trouble needed for the separation of the last traces of impurity; cresylic acid is liquid, it boils at 203° C., and closely resembles carbolic acid in odour and other properties. Before the commencement of these inquiries it was thought to be of little or no value as a disinfectant, but Dr. Angus Smith has lately shown that it rivals, if it does not surpass, carbolic acid in antiseptic properties. For the present purpose of Cattle Plague disinfection it is immaterial which acid is used, and to avoid unnecessary repetition I shall use the term carbolic acid to express either acid, or the commercial mixture of the two acids.

34. From time immemorial carbolic acid, creosote, or bodies containing them, have been used as antiseptics. Passages in Pliny read by the light of chemical science, show that the Egyptians used for embalming their mummies a compound made from pitch, which must have contained large quantities of creosote. Carbolic acid is the active agent in tar, which either in its ordinary state, or burnt as a fumigator, has always held high rank amongst disinfectants. Pitch and tar were the most popular medicines in use against the Cattle Plague when it visited this island in the last century; the animals being preserved against contagion by having their noses and jaws rubbed with tar, whilst the cowhouses were disinfected by burning pitch and tar in them (in which process a certain quantity of the vapours of carbolic acid would escape combustion). The almost universal custom of burning gum resins and odoriferous woods in connection with religious ceremonies may have originally arisen from the disinfecting powers of the creosote in the smoke. The well-known efficacy of smoke in preserving meat is entirely due to the presence in it of this agent.

Pitch oil, oil of tar, and similar products, owe their value entirely to carbolic acid (22.). This body may in fact be called the active principle of tar, just as quinine is the active principle of bark, or morphia of opium, and it has the great advantage of being easily prepared in any country where coal or wood can be obtained.

35. Sulphurous acid probably owes some of its antiseptic value to its affinity for oxygen, whereby the oxidation of the matter under treatment is retarded. It has been suggested that the value of carbolic acid is due to a similar property, and that it acts merely by preventing oxidation. It being important to a thorough understanding of its action that this point should be settled, the following experiments were made:—

I. Lumps of metallic sodium were cut with a sharp knife: the progress of the oxidation could be readily followed by the change of colour of the surface. The experiment was tried several times in an atmosphere strongly charged with the vapour of pure carbolic acid and of cresylic acid; comparative experiments being made at the same time in pure air. No difference in the rate or amount of oxidation could be detected.

II. A colourless solution of subchloride of copper in ammonia was prepared and divided into two parts; one being mixed with a little carbolic acid. On pouring them through the air into flat white dishes, no difference in the progress of oxidation could be detected.

III. A mixture of pyrogallic acid and solution of potash was shaken up in a large stoppered bottle. It was then opened under water, and the amount of absorption of the atmospheric oxygen noted. The same experiment was repeated after the addition of carbolic acid to the potash solution. The same quantities were used and the agitation was continued for the same time. On again opening the bottle under water the absorption was found to be the same as before.

IV. The last experiment was repeated, substituting crystals of sulphate of iron for pyrogallic acid. The result showed equally that the presence of carbolic acid exerted no retarding influence on the oxidation.

V. Iron filings were shaken up in water with the same result.

VI. A "philosophical lamp" was made by arranging a platinum spiral over the wick of a spirit lamp, containing alcohol mixed with a little ether; on lighting, and then blowing it out, the platinum continued to glow brightly. Pieces of solid carbolic acid were then carefully placed in the cup of the brass wick holder, surrounding, but not in contact with, the wick. The heat soon melted the acid and raised its vapour round the platinum spiral, but without occasioning any alteration in the brightness of its glow.

VII. Lead pyrophorus was poured into two long and narrow jars of air, one of which had its interior moistened with liquid carbolic acid. Not the slightest appreciable difference could be detected between the rapidity of oxidation in the two jars.

VIII. Paper moistened with sulphate of manganese solution, and dried, was dipped into caustic ammonia, both with and without carbolic acid. No difference whatever could be detected in the rate of its darkening.

These experiments prove conclusively that the tar acids have no special power of retarding oxidation.

36. Other experiments were then instituted in the endeavour to understand more clearly the mode of action of carbolic acid.

IX. Some meat was hung up in the air till the odour of putrefaction was strong. It was then divided into two pieces; one was soaked for half an hour in chloride of lime solution, and was then washed and hung up again; the offensive smell had entirely gone. The other piece of meat was soaked in a solution of carbolic acid containing one per cent. of the acid; it was then dried and hung up. The surface of the meat was whitened, its offensive odour was not removed, though it was masked by the carbolic acid. In two days' time the bad odour had quite gone, and was replaced by a pure but faint smell of carbolic acid. In a few weeks' time the pieces of meat were examined again. The one which had been deodorised with chloride of lime now smelt as offensively as it did at first, whilst the piece treated with carbolic acid had simply dried up, and had no offensive odour whatever. It was then hung up for another month and examined; no change had taken place.

X. A piece of fresh meat was soaked in a one per cent. aqueous solution of carbolic acid for one hour; it was then wrapped in paper and hung up in a sitting-room in which there was a fire almost daily; at the end of ten weeks it was examined. It had dried up to about one-fourth of its original size, but looked and smelt perfectly good and fresh, a very faint odour of carbolic acid being all that was perceptible. It was soaked for 24 hours in water, and then stewed with appropriate condiments and eaten; it was perfectly sweet, and scarcely distinguishable from fresh meat, except by possessing a very faint flavour of carbolic acid, not strong enough to be unpleasant.

XI. Animal membranes in the forms of gut, skin, and bladder, were perfectly preserved if immersed direct in aqueous solution containing 1 per cent. of carbolic acid; but if previously moistened with water, and then immersed in dilute carbolic acid, the preservation of the skins was not so complete.

XII. Animal size and glue, mixed, in the form of solution, with small quantities of carbolic acid, were perfectly preserved from change even in hot weather.

These are important experiments. They point out in a striking manner the difference between mere deodorizers and antiseptics. Hitherto attention has been almost entirely confined to the deodorization of gases arising from putrescence. The effect has been combated, whilst the removal of the cause has received scarcely any attention. Chloride of lime, one of the strongest of the class of deodorizers, acts, as has been shown, only on the gases of existing putrefaction, but it has no influence over the future. Carbolic acid, on the other hand, has scarcely any action on fœtid gases; but it attacks the cause which produces them, and, at the same time, puts the organic matter in such a state that it never re-acquires its tendency to putrefy.

37. It became now a matter of considerable interest to ascertain in what way carbolic acid acted in arresting decomposition, and the following experiments were made with the object of clearing up this point:—

XIII. Albumen was mixed with four times its bulk of water, and a one per cent. solution of pure carbolic acid was added to it. No change took place for the first few minutes, but after a little time a white cloudiness was formed, which gradually collected together into a coagulum. On separating this, and exposing it freely to the air, it entirely resisted putrefactive decomposition. The solution strained from the coagulum still contained carbolic acid and uncoagulated albumen.

XIV. The same experiment was repeated with pure cresylic acid. This acid has still less affinity for albumen, the mixed solutions remaining clear for nearly half an hour.

It is evident, therefore, that the tar acids do not owe their special action to their coagulating powers on albumen, for the last two experiments show, contrary to the generally received opinion, that their affinity for this body is but slight.

XV. A few drops of carbolic acid, added to half a pint of sugar syrup and yeast in full action, immediately put a stop to the fermentation.

XVI. Fresh brewer's yeast was washed with a solution of one per cent. of carbolic acid, and then with water. Its power of inducing fermentation in a solution of sugar was entirely destroyed, although no perceptible change in the appearance of the yeast cells could be detected under the microscope. This experiment was repeated several times, and always with the same result, although when the yeast was simply washed in water it readily induced fermentation.

The odour of carbolic acid adhered most pertinaciously to the yeast, and by no ordinary amount of washing and exposure to the air could it be removed.

XVII. Strychnine was added to a mixture of yeast and sugar solution in full fermentation. No visible effect was produced, the evolution of carbonic acid continuing as brisk as before.

The above experiments, some of which were performed by my friend Mr. Spiller, prove conclusively that carbolic acid has a special action on the fermentation induced by organized matter; it not only arrests it instantly when in progess, but it prevents the development of future fermentation.

38. The action of the tar acids was now examined on certain chemical bodies, which are supposed to act by fermentation, in order to see if they were influenced in the same manner:

XVIII. A solution of diastase (infusion of malt) was mixed with thick starch paste, and a one per cent. solution of carbolic acid. On gently heating for a short time, the starch was converted into dextrine, as completely as if no carbolic acid had been present.

XIX. Amygdalin was mixed with synaptase (emulsion of sweet almonds) in the presence of carbolic acid. The formation of the essential oil took place with apparently the same readiness as if carbolic acid had been absent.*

The foregoing results show that carbolic acid has no action on purely chemical ferments. These consist of definite nitrogenous compounds acting simply by chemical affinity, and therefore ought not to be classed with true ferments, which are living bodies. It, therefore, appears that carbolic acid acts by attacking

* These last two experiments are confirmatory of a statement in Dr. Lemaire's work "Sur l'Acide phénique."

vitality in some mysterious way, and where an effect is merely due to so-called catalytic force, it exerts no interfering action.

39. The action of carbolic acid on vitality was then tested in other ways :—

XX. Cheese mites were immersed in water, where they lived for several hours. A few drops of a solution of carbolic acid containing one per cent. added to the liquid, killed them instantly.

XXI. An aqueous solution of carbolic acid was added to water in which a small fish was swimming. It proved fatal in a few minutes.

XXII. A very minute quantity of a weak solution of carbolic acid was added, under the microscope, to water containing various infusoria, such as bacteria, vibrios, spirilla, amœbæa, monads, euglenæa, paramecia, rotifera, and vorticellæ. The acid proved instantly fatal, arresting the movements of the animalcules at once.

These animalcules are the almost invariable accompaniments of putrefactive fermentation. The above experiment has been tried with putrid blood, sour paste, and decayed cheese, and in every instance the destruction of vitality and the arrest of putrefaction have been simultaneous.

XXIII. Caterpillars, beetles, crickets, fleas, moths, and gnats were covered with a glass, the inside of which was smeared with carbolic acid. The vapour proved quickly fatal. It allays the pain caused by the stings of bees, wasps, hornets, and gnats, if applied pure, or in strong solution, to the wounded part.

I find it recorded by Dr. Lemaire, and other observers, that carbolic acid vapour will also kill flies, ants and their eggs, lice, bugs, tics, acari, mosquitoes, aphides, butterflies, earwigs, wood-lice, cockchafers, centipedes, and other insects of this size; its vapour, however, does not appear to be strong enough to act injuriously on animals larger than mice. When such animals are killed with it, their bodies dry up in the air, and resist putrefaction for some time.

40. From the intense aversion shown by all insects to the odour of carbolic acid, it is probable that the plentiful use of this agent would effectually preserve cattle from those terrible scourges met with in certain parts of Africa, the zimb and tsetse fly. The effects following the bite of the latter have been described to me as being almost identical with the symptoms of Cattle Plague.

M. Lucien Biard, in speaking of the invasions of the large ants of Mexico, says that when one of their battalions threatens his house, he sprinkles a little carbolic acid in front of it. The army immediately makes a detour to avoid the obstacle.

When an animal is killed by the injection of a saturated aqueous solution of carbolic acid into its veins, circulation is instantly arrested, the blood is not coagulated, and no alteration, either in the shape or the appearance of the globules, is detected under the microscope. The only apparent change consists in the immobility of the globules.

41. In the "Annales de Chimie et de Physique" for October last, there is a letter from M. Bĕchamp to M. Dumas, in which it is said that creosote appears to be the agent which most strongly opposes the development of organic ferments, but that it does not interfere with the living ferments or animalcules when they are once developed. This assertion is in direct opposition to all my experiments, about the accuracy of which I have no doubt whatever, having submitted them to repeated tests. The powerful action which carbolic acid exerts on the phenomena of life is the most remarkable property which it possesses. It may be looked upon as the test proper for distinguishing vital from purely physical phenomena, and in most cases its action is characterised by the certainty and definiteness of a chemical re-agent. In the presence of carbolic acid the development of embryotic life is impossible, and before its powerful influence all minute forms of animal life must inevitably perish.

42. It may be considered as definitely proved that the vapour of carbolic acid, in the atmosphere, exerts a special selective power on all minute organisms possessing life. If the contagious matter of Cattle Plague is possessed of organic vitality, as must be now admitted, it will be destroyed, beyond the possibility of revival, when brought into contact with the vapour. French experimentalists have repeatedly tested the influence of carbolic acid on vaccine lymph. They have employed lymph both pure, and mixed with a trace of carbolic acid. The vaccination with pure lymph was followed by the usual results, but in no single instance was any effect produced by the lymph containing carbolic acid.

43. The following experiment tends to show a similarity between the action of vaccine virus and that of the Cattle Plague :—

XXIV. The air from a close, highly infected shed (57.) containing animals in the last stage of the disease, was drawn through glass tubes containing tufts of cotton wool, in the expectation that some of the virus-cells, supposed to be floating about in the atmosphere, would be arrested by the wool.

The suction was continued for ten minutes. One piece of the infected wool was then exposed for half an hour to the vapour of carbolic acid. Two apparently healthy calves were selected, and an incision being made beneath the skin, these pieces of wool were respectively inserted in each. The animal thus inoculated with the infected wool, which had been exposed to carbolic acid, remained perfectly well, but the other animal took the disease and died in a few days.

I place this upon record, although I do not attach much importance to it, as the experiment was made at a farm where the plague was raging; and it is quite possible that the calf which died, did not take the disease from the wool. Unfortunately time would not permit me to verify this experiment so as to place its results beyond doubt. It is likewise desirable to inoculate with the virus itself, collected from the eyes, &c. of diseased animals, mixed with different quantities of carbolic acid. There can be little doubt that the issue would prove satisfactory.

44. I first employed carbolic acid on a large scale early in December last. Considerable experience suggested to me the best way of proceeding, and I consider that the results have proved that my views were correct. A detailed account of the various experiments is given in the next Part.

I had two objects in view : firstly, to apply the energetic disinfecting powers of sulphurous acid for the purpose of purifying the cattle sheds two or three times a week; and secondly, to trust to carbolic acid as a permanent means of protecting the animals from extraneous infection. Sulphur fumigation and carbolic acid agree very well together, and somewhat assist each other's action; whereas oxidizing disinfectants, used either with carbolic acid or sulphurous acid, are inoperative; the energies which should be directed to the destruction of infection being exhausted in neutralizing each other. When dealing with such an overwhelming amount of putrefying and putrescible organic matter as is met with in a farm-yard, it is of paramount importance to economize as much as possible the disinfectant. I have already shown that chlorine and ozone are very wasteful agents. As it is our chief aim to destroy the activity of Cattle Plague virus, (the destruction of ordinary farm-yard odours being of secondary importance,) even sulphurous acid is open to objection on the score of waste; but carbolic acid goes direct to the root of the evil, and acts solely where it is most required, without touching the innocuous dunghill stenches Owing to the power possessed by carbolic acid of arresting and preventing decomposition, it checks the evolution of these offensive odours, and, by retaining the nitrogenous compounds in the manure, it greatly increases its value. At the same time it stops the development in the manure of minute animal organisms, and it has been observed that flies never congregate about dunghills where carbolic acid has been habitually used (100.),

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whilst the liquid manure which oozes from them is without smell. In stables and cowsheds this property is of very great importance, both as regards the comfort and health of the animals, especially during the hot summer months.

45. Another advantage of carbolic acid, over almost all other disinfecting agents, consists in the fact that its vapour is never injurious or unpleasant to cattle. Indeed, they seem to like it; they lick the woodwork of their stalls, after it has been sprinkled with the undiluted acid (69.), and will readily drink water in which the acid has been dissolved. If applied to their mouths in its undiluted state, I am told that it will produce temporary blistering; but such blisters are entirely free from danger, and heal very rapidly. From its action on the human skin, if carelessly used, I have no doubt that inconvenience to the cattle might arise; but although carbolic acid has been used freely by me, and by many farm servants under my directions, in the treatment of several hundred animals, I have not had a single instance of this action brought under my personal notice.

If undiluted carbolic acid is allowed to remain on the hands, it will act as a mild caustic. This inconvenience is, however, very slight, and may be avoided with ordinary care. I have had my hands repeatedly covered with carbolic acid during the last four months, without experiencing any painful effect. Ample warning of the approach of blistering is given by a preliminary smarting, and if this is attended to, and the acid rubbed or washed off, no further annoyance is felt. Sweet oil rubbed over will remove the last traces of the acid.

46. Finding that medical and scientific writers were unanimous in the opinion that small internal doses of carbolic acid were attended with no injurious effect, I have recommended the addition of small quantities both to the food and water given to the whole of the stock, sick or healthy, on the farm. This has a two-fold action. The water given to cattle is seldom very pure, and carbolic acid will neutralize any virus of infection which may happen to have found its way into it. Moreover, after drinking aqueous carbolic acid, the breath smells of it for some hours. Now it is very probable that the germs of infection enter the animal system through the mouth (17.), and by thus loading the breath with the antidote, it is reasonable to suppose that these germs would be destroyed before they had an opportunity of doing harm. The vapour of the acid, diffused through the air, will kill large insects; it is reasonable, therefore, to suppose that it will much more readily destroy microscopic germs when brought into contact with its vapour during respiration. Besides, it is not unlikely that after the system has become habituated to repeated doses of carbolic acid, it will acquire additional power of resisting the first attack of disease.

Since this investigation was undertaken, I have made a collection of cases, illustrating the good effect of carbolic acid, in arresting the spread of the Cattle Plague, in various parts of England and the Continent. I will not, however, enter into particulars, but confine myself to those cases which have come under my own immediate knowledge.* I have not yet met with a single instance in which the plague has spread on a farm where this acid has been freely used.

On the Adulterations of Carbolic Acid, and their Detection.

47. The official recommendations (50.) have naturally brought into the market many substitutions for carbolic acid, in which the valuable agent is diluted with cheap inert bodies, whilst the price charged, in some cases, is higher than that of the genuine article. Specimens of two such substitutions, called cresyline and carboline, were forwarded to the Royal Cattle Plague Commission for approval, "as being more "certain disinfectants than most of the carbolic acids "now being sold to the public, many of which contain "but a very small per centage of that acid." It was stated that the preparations contained over 60 per cent. of carbolic acid, and were miscible with water. As it was possible from these and other reputed advantages, that the preparations might be of considerable value, they were forwarded to me for examination. Cresyline consists of alkaline water, and tar oils boiling above 370° C., therefore containing little or no carbolic or cresylic acids. Carboline is a dilute solution of caustic soda, containing 4·1 per cent. of carbolic acid. The price of these preparations is higher than that ordinarily charged for good commercial carbolic and cresylic acids.

Other creosote samples from different makers were found to contain respectively 4·5, 2·6, 5·9, and 4·2 per cent. of carbolic acid, the rest being tar oils. In other instances, articles have been sold as commercially pure carbolic acid, which were found to contain from 30 to 50 per cent. Frequently a very fœtid sulphur compound is allowed to remain. This should be avoided, as although the antiseptic powers of the liquid are great, the offensive odour which it diffuses round the neighbourhood is excessively nauseous.

48. It is by no means difficult to detect the adulterations referred to above. Commercial carbolic acid is soluble in from 20 to 70 parts of water, or in twice its bulk of a solution of caustic soda, while oil of tar is nearly insoluble; but if the amount of carbolic acid be increased some remains undissolved.

To apply the tests:—1, Put a teaspoonful of the carbolic acid in a bottle, pour on it half a pint of warm water, and shake the bottle at intervals for half an hour, when the amount of oily residue will show the impurity. Or, dissolve one part of caustic soda in 10 parts of warm water, and shake it up with five parts of the carbolic acid. As before, the residue will indicate the amount of impurity.

These tests will show whether tar oils have been used as adulterants; but to ascertain whether the liquid consists of a mere solution of carbolic acid in water or alkali, or whether it contains sulpho-carbolic or sulpho-cresylic acids, another test must be used, based upon the solubility of these, and the insolubility of carbolic acid, in a small quantity of water. In this case proceed as follows:—2, Put a wineglassful of the liquid to be tested in a bottle, and pour on it half a pint of warm water. If the greater part dissolves, it is an adulterated article. Test the liquid in the bottle with litmus paper; if strongly acid it will show the probable presence of sulpho-acids, whilst if alkaline it will show that caustic soda has been probably used as a solvent.

These tests are not given as having any pretensions to scientific accuracy, but as affording persons who are desirous of using carbolic acid, and are willing to pay a fair price, a rough and ready means of seeing if they are being imposed upon.

If greater accuracy in the tests are required, recourse should also be had to distillation with a thermometer,—carbolic acid boils at 184° C., cresylic at 203° C., whilst xylic acid (96.), which may possibly be present, and has great antiseptic value, boils at 220° C. Reichenbach's pure creosote (33.) boils at 219° C.

PART III.

Disinfecting Experiments on the Farm.

49. For all practical purposes infection may be considered as radiating from a focus, and following the same law as other radiant forces. At the centre, which may be a diseased animal, an infected shed, or farm, the danger is at its maximum, and it decreases in intensity inversely as the square of the distance from the focus increases. A certain amount of resisting power is unquestionably conferred on an

* It may, however, be of interest to state that carbolic acid was the principal substance used in the Jardin d'Acclimatation, in the Bois de Boulogne, to prevent the spread of the disease amongst the animals in that establishment. According to the Journal of the Society of Arts for April 13th 1866, more than twenty pounds of this acid were used daily, in washing the walls and mangers, and in sprinkling the floors of the stables and enclosures, and it is to its constant use that the arrest of the malady is generally attributed.

animal by carbolic acid, and it is important to know how near cattle so protected, can approach an infected centre, and still remain safe. The simplest experiment, and the one most likely to succeed, is to endeavour to protect a healthy farm from the march of the closely investing plague (51. 52. 66. 67.). Here the resisting power is at its maximum, whilst the intensity of the infection is at its minimum. Next, in order of severity, is the test of stopping the plague when it has invaded a farm (58. 60. 68. 72.). A yet severer test is the attempt to prevent the communication of the plague to a healthy animal when kept by itself in an infected shed, or to protect a healthy animal placed by the side of a diseased one (54. 59. 65.). Lastly, in order of severity, is the attempt to counteract inoculation, and to destroy the virus when it is actually present in the system of the animal (77. to 96.). Viewed in one light, this latter experiment belongs to medical science, a subject which is out of my province, but, in another light, it is merely the last link in the chain of experiments on disinfection, and as such clearly within the domain of a chemist.

It was to test the value of disinfection, under the various circumstances here referred to, that I was authorized to proceed to infected districts and carry out practical operations at farmhouses.

Plan of Disinfection recommended.

50. I have not thought it necessary to give any detailed recommendations, concerning the best method of utilizing the valuable antiseptic properties of carbolic and sulphurous acid, since the official recommendations for disinfection, issued by the Royal Commission on February 23d, are very explicit on that point. With a few alterations, suggested by wider experience, they will agree perfectly with my plan of proceeding.

Experiments at Mrs. Carmichael's Farm.

51. This farm is situated about three miles from Thirsk in Yorkshire. In November last I first heard that the disease had attacked several farms in the neighbourhood. I at once sent down a supply of carbolic acid, with minute instructions for its employment. Hearing shortly afterwards that the disease was rapidly spreading round the farm, I went down to Thirsk, personally to instruct the farm servants in properly carrying out my plan. I found the disease was making terrible ravages on adjoining farms; the death wave had rolled across the country up to these herds, and judging from the virulence the disease had already manifested, there could be little doubt that Mrs. Carmichael's farm would speedily be attacked. I found 25 heads of cattle on the farm, all in perfect health. The cow sheds were well cleaned out, whitewashed with lime and carbolic acid, fumigated with sulphur, and thoroughly sprinkled over the floors, walls, and rafters with carbolic acid. The manure in the fold yard was watered with a one per cent. solution of carbolic acid, and the open sheds were also well sprinkled with the undiluted acid. The horns, legs, feet, tails, &c., of the cattle were painted over with the aqueous solution, by means of a brush, every night and morning, the clothes of the men were also sprinkled with the liquid, and they were told occasionally to dip their hands in it. Pieces of carpet, matting, sacks, &c. were hung up in the sheds, and were kept wetted with carbolic acid.* Instructions were left for the whitewashing to be done every fortnight, the fumigation with sulphur twice a week, and the other operations daily.

On visiting this farm a second time, I found that my instructions had been carefully carried out, and although nearly every other farm in the neighbourhood was severely visited with the disease, this was unattacked. This exemption is the more remarkable, as on an adjoining farm, held by a near relative, many cattle died; and during the whole of the time there was frequent communication between the two families.

* For some of these practical hints I am indebted to my friend, Professor A. H. Church, who was, I believe, the first to publicly recommend the employment of carbolic acid as a preventive against the Cattle Plague.

Up to the date of this report, Mrs. Carmichael's farm has kept free from the plague, and is now, I believe, the only one that has escaped for some miles round. Owing partly to the vigorous carrying out of the late Act, and partly to there being fewer animals for the disease to attack, the plague is now leaving the neighbourhood.

Experiments at Sir G. Wombwell's Farms, Newburgh, near Thirsk.

52. On the 17th of February I superintended the thorough disinfection of Sir G. Wombwell's Home farm, and left full written instructions with his bailiff. This farm, and one about a mile off, belonging to Mr. Easton, were the only farms in that neighbourhood free from the disease. On the same day I superintended the disinfection of Mr. Easton's farm. My instructions have been carefully carried out, and notwithstanding the ravages of the disease all round, it has kept off these two farms.

Experiments at Mr. Daniel's.

53. This is a very large farm at Oulston, 10 miles from Thirsk. When I first arrived there I found the disease raging violently; out of a herd of 66 on the 1st February, 45 only remained by the middle of the month, and fresh cases of illness were being reported daily. Owing to the extent, and very inconvenient arrangement of the premises, I felt that it would not be a fair trial to attempt to stop the plague on this farm, as the buildings were already saturated with infection, and all the details required for an accurate experiment could not be properly carried out. Permission was asked, and freely given, to try certain other experiments here.

54. A shed was selected some distance from any other building, which had been used as a hospital for the cattle as they fell sick; several had died in it, and it then contained a diseased animal almost moribund; no system of disinfection had been adopted, and the stench was very bad. The sick beast having been removed and tethered to an outside wall, the litter was cleared away, and the floor washed with a two per cent. solution of carbolic acid. The walls, roof, and rafters were then whitewashed with freshly burnt lime, a pint of carbolic acid being added to each pailful of whitewash. The floor, after cleaning, was thoroughly sprinkled with undiluted carbolic acid, and the wood-work and inside of the door rubbed with a cloth dipped in the same. The ventilating holes were then stopped up with hay, and the door being kept shut, one pound of stick sulphur was burnt on a shovel full of red hot cinders placed in the middle of the floor. After two hours, on opening the place, it was found full of a thick white vapour, which disappeared in the course of half an hour. In the meantime Mr. Hain, veterinary surgeon of Thirsk, (to whom I am under many obligations for valuable advice and assistance in the course of these experiments,) had procured a healthy two-year old bullock from a farm about two miles distant from any infection. The diseased animal, formerly occupying the shed, was then tied to a stake at the end of the shed, whilst the healthy animal was fastened up near the door. Directions were left to continue treating the sick beast as hitherto, and to give the healthy one fresh hay and water, mixed with one ounce of carbolic acid per diem. The shed was to be well sprinkled daily with carbolic acid, all over the floor and walls, as high as could conveniently be reached, and to be fumigated with sulphur once a week, and whitewashed every fortnight, as long as the experiment lasted. The farm was visited every day for a week, and on leaving I gave full written instructions to Mr. Daniel, who promised to attend personally to the experiment. Mr. Hain also promised to ride over two or three times a week, and report progress.

55. In a few days it became evident that the experiment would be much more severe than had been intended. The size of the shed, 15 feet by 9 feet, was insufficient to prevent the animals touching occasionally; the hind quarters of the healthy

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beast were soiled with the liquid alvine discharges from the diseased one, and on one occasion the former was seen to lick a part so smeared. Actual inoculation, therefore, might be considered to have taken place, and the question now became, how great a power of resisting the infection would the carbolic atmosphere, which the animal was breathing day and night, confer upon it. Absolute immunity was scarcely to be hoped for, and all that now remained was to see how long the means employed would enable the animal to withstand the disease.

56. The animals were put together on the 15th of February. On the 21st the diseased one died in the shed; its body was removed, and replaced the next day by another sick animal. For a month the experiment progressed satisfactorily, when the healthy animal showed signs of illness, but in a very mild form, and in a few days recovered.

This experiment, although not so satisfactory as if the animal had entirely resisted infection, is, so far as it goes, very striking and valuable. Allowing nine days for the period of incubation, it shows that the antiseptic powers of sulphurous and carbolic acids ensured absolute immunity for nearly three weeks, and finally, when the animal did succumb to this very severe test, deprived the disease of its malignant character. The relative position of the animals in the shed was unfortunate. The healthy animal being close to the door, the man who looked after the diseased animal and brought it food was obliged to pass close to it daily. Also the filth and droppings from the diseased animals had to be passed out daily close to the healthy one, and the dead bodies were likewise dragged out the same way. Actual contact between the healthy animal and infected matter must therefore have repeatedly taken place. Considering the crucial severity of this trial, it is a very encouraging fact to have warded off an attack for so long a time.

57. On the 15th of February I selected, at the same farm, another small shed containing three animals in the last stage of the disease, and in which several had previously died in rapid succession. The place had not been cleaned out for some time, and was pervaded by the characteristic stench of the disease. In this shed I spent the greater part of the day, collecting specimens for future examination.

a. Several tubes of air from different parts of the shed, and from the nostrils of a dying cow, were collected and sealed up before the blow-pipe.

b. Tufts of cotton wool having been pressed into glass tubes, air from the cow's nostrils and from different parts of the shed were sucked through them severally for ten minutes.

c. A very clean flask was filled with ice, a clean cup suspended beneath it, and the whole hung up to a beam in the centre of the shed, just out of reach of the animals. The moisture, condensing on the outside of the flask, dropped into the cup, and was preserved in a clean stoppered bottle. It took 36 hours to collect a quarter of an ounce of liquid.

d. The air of the shed was likewise examined by shaking it, in a bottle of known capacity, with a standard solution of permanganate of potash; but as no two determinations were obtained at all near to each other, nothing was shown by these experiments, except that air taken from close to the animals' mouths was more charged with organic matter than that taken from other parts of the shed.

The tubes of air, cotton wool, and condensed vapour were forwarded to Dr. Angus Smith, who kindly undertook their examination.*

Mr. Bainbridge's Farm.

58. This farm is likewise at Oulston, close to Mr. Daniel's, where the disease was spreading with the greatest virulence. It had broken out here a few days before I arrived. The original stock consisted of 41 fine healthy beasts. The farm-buildings were kept beautifully clean, no pains or expense had been spared to keep the herd in good health, and Mr. Bainbridge was willing to adopt any means likely to save his stock. In the four days between the first outbreak and my visit, three animals had died, one was ill, and another suspected. Disinfection was immediately commenced by white-washing and sprinkling with carbolic acid, and burning sulphur, substantially in the way recommended in the Official Recommendations. In effecting this, I was ably seconded by Mr. Bainbridge, and his very intelligent foreman, Mr. Hardcastle, both being unremitting in their endeavours to carry out the experiment in a satisfactory manner.

Some little delay occurring in procuring a sufficient supply of carbolic acid, the whole of the buildings could not be thoroughly done until nearly a week later. Then, after the animals already diseased had died, the plague left the farm, and, up to the present date, no further attack has taken place.

59. The hospital shed, to which Mr. Bainbridge's cattle had been removed when they exhibited signs of illness, and in which three had died, being in a field a quarter of a mile away from any other building, was well adapted for experimental purposes. Permission being freely given to make what use I liked of it, I had it thoroughly cleaned, and disinfected with carbolic acid, whitewash, and sulphur, in the manner already described (54.). A two-year-old bullock, from a farm a mile distant from any disease, was put into one of the stalls, and in the adjoining stall a diseased heifer was tied, in such a manner that actual contact was impossible. When, a few days after, this died, there being no other case to substitute for it, the healthy beast was kept by itself. Sprinkling with carbolic acid, sulphur fumigation, and whitewashing were strictly carried out, and for nine days the experimental bullock remained healthy. It then showed signs of disease, and died on the 13th day.

Miss Barroby's Farm, Dishforth.

60. The experiments here have been conducted with greater accuracy than was possible at other places, and the results consequently are more striking. On February the 20th I accompanied Dr. Ryott, of Thirsk, to this farm, where the disease had broken out amongst a valuable herd of pedigree short horns. The animals appeared to be tended as carefully as if they had been hunters. The buildings were scrupulously clean, the only fault being their close proximity, which rendered a proper separation of the diseased from the healthy impossible. The only available part of the premises, where the graves could be dug, was also too near the houses, and many of the carcases had to be dragged close by the doors where healthy beasts were confined. A very valuable large red bull, owing to the position of his house, was especially in danger. To attend to the sick beasts, certain men had been told off, and were even provided with a special sleeping apartment in the house, and no communication whatever was permitted them with the other farm servants.

I took some carbolic acid with me, and at once instructed the farm servants in its use, and directed the preparation of whitewash and fumigation with sulphur. Not having sufficient acid to disinfect the whole of the premises, a large supply was ordered, and attention was chiefly directed to the houses containing the healthy stock, more especially to that of the large red bull.

61. The virulence of the disease may be judged of by the following tabular statement:—

Total number of beasts 32.

Jan. 24.—A severe case: recovered.
Feb. 2.—One animal attacked: died on the 3d.
" 7.—One animal attacked: died on the 11th.
" 13.—Six ill.
" 15.—Nine ill.
" 20.—Visited Dishforth.
" 23.—Five ill. Seven dead.
Feb. 25.—Four killed by order of inspector. Three ill. Two new cases.
" 26.—Two killed.
" 27.—The whole of the premises were thoroughly disinfected with carbolic acid and sulphur according to written instructions.

62. From this date the disease suddenly stopped. Two young bulls and two cows, ill before the disin-

* *See* Dr. Angus Smith's Report, Part II.

fecting operations had commenced, were subsequently killed by order of the inspector; but no fresh case occurred, although the disease continued to attack neighbouring farms as severely as before.

63. Dr. Ryott, who spared no trouble to have these experiments properly carried out, and to whom I am greatly indebted for his kindness in superintending them during my absence, has kept me constantly informed of the results. At the date of this report all the animals are looking remarkably well and healthy; not one fresh attack having taken place since the 27th of February, when disinfection was effectually commenced.

The convalescent cows are now intermixed with those which have escaped the disease, and of the latter, two about to calve are tied up in the house where three animals had died, some also are kept in houses from which diseased animals were removed.

The large red bull, which now occupies a shed wherein were formerly a diseased cow and heifer, is thriving, although both the sick animals had to pass the open end of his shed on their removal from the other houses, and the dead were conveyed by the same road to their burial. All this time the disease keeps in the village, fresh outbreaks are reported frequently, and on some farms nearly every head of cattle is swept off.

Dr. Ryott having examined the milk, and found it free from taint, two of the convalescent cows are now supplying the family daily with milk, cream, and butter.

The man who was principally employed with the diseased animals, is now attending to the lambing of the ewes; as yet they are all well, and show no signs of illness.

64. Dr. Ryott writes, under date March 27th, "There can be no doubt of the value of the plan "of disinfection, after what I have observed in "such a severely plague-smitten place as Dishforth, "not only in the protection of cattle, but also of "sheep,—as ewes at lambing time would be most "susceptible. But the plan of disinfection may be "brought into disrepute by being either improperly "or insufficiently applied. For instance, hearing "that a farmer in whom I took some interest had got "the disease amongst his cattle, I called on him, and "found several ill, and some already dead. I recommended the plan of disinfection as a protection "to the healthy animals in another fold, and as a "beginning gave him a gallon of carbolic acid. "A week after I visited him, and found that several "animals had been killed, and others were ill, waiting "the executioner. He said he had tried everything, "but particularly the treatment of Mr. Worms, and "had used the disinfectant plan. On inquiry, I found "that not more than *half a pint* of the carbolic acid "had been used, out of the gallon I gave him, and yet "he said he had tried the plan, and had given out "that it had failed!"

65. An opportunity was afforded at this farm of trying a somewhat important experiment. A shed in which two cows had died, was disinfected (54.), and a short-horn cow—a prize beast—which had calved about a week, and had just shown signs of disease, was shut up in it. As the yield of milk had not stopped, a healthy calf was put in the same house, and allowed to suck the diseased cow during the whole time she lived; the only precaution taken being to keep the atmosphere of the house strongly smelling of carbolic acid. This experiment was unfortunately cut short by the inspector insisting on the slaughter of the cow, although she had then almost recovered from the disease. This happened during my absence, notwithstanding the energetic remonstrances of Dr. Ryott, who explained that it would interrupt a valuable experiment, and that I was empowered to reserve infected animals for such purposes. Since the cow was killed, (March 3d) the calf has remained well and lively in the same house, and has been fed with milk from another cow which was recovering from the disease. It is much to be regretted that this experiment was not allowed to be properly carried out, but, incomplete, though it be, it is of great value especially when viewed in conjunction with the other operations on the same farm.

Mr. Spence's, Smedley, near Manchester.

66. I arrived here in December last, and instructed the attendants in the management of the disinfecting plan with carbolic acid and sulphur. It has been regularly carried out ever since. In January last the disease first appeared in the immediate neighbourhood, and carried off about a dozen cattle from a farm, the sheds of which were not more than 500 yards from Mr. Spence's cows. A short time after, 30 beasts, 750 yards off on another side, were attacked, and the whole were swept off in rapid succession. A month ago, the disease appeared amongst 22 in another direction, not more than 50 yards off, and the whole of these also died. Mr. Spence's cattle still keep well, and as the disease is leaving the neighbourhood, there is every probability that they will remain healthy.

Mr. Thornton's Farm.

67. This is situated at Clayton Bridge, near Manchester. The stock consists of 10 milch cows, and the shed containing them has been regularly disinfected with carbolic acid since Christmas. No case of illness has occurred, although on the adjoining farms the disease has been rather severe for some months.

Mr. Lowe's, Smethwick Hall, Brereton, Cheshire.

68. This farm is in the centre of one of the most affected localities in England. The stock consists of 73 animals; 45 milch cows, kept in houses which have been regularly disinfected since December last; and 15 two-year-old heifers, and 13 yearling calves, kept in fields and open sheds. To these latter, no disinfectant whatever has been used, owing to the impossibility of applying it satisfactorily to animals in the open air.

69. The disease prevailed very severely all round, but no case occurred at Mr. Lowe's farm until February, when one of the 45 milch cows showed signs of illness. Immediate investigation was made, and it was found that one of the cowmen, on the previous day, had attended a post-mortem examination of some diseased beasts, and having come directly to Mr. Lowe's houses, afterwards had milked some of the cows. The man was of course discharged instantly. The succeeding day, February 20th, the first cow that the man had milked, on the day of the post mortem, refused her food, and all the symptoms of the plague rapidly appeared. Two others in the same house were afterwards attacked, one of which recovered almost immediately; the other was killed as a matter of precaution. A fourth case then occurred in another shed. On inquiry, I found that the first, third, and fourth cows were those which had been milked by the discharged man. The second case, occurring in the same shed with the first and third, was evidently either developed from them, or was a case of infection brought from the calves mentioned below (70.). These four cases are all that have occurred amongst the 45 milch cows in the disinfected sheds. Up to the present date the rest are perfectly well. Their health, indeed, seems to be improved by the carbolic acid. The cows are very fond of it, and lick it from the woodwork or walls whenever they have an opportunity.

70. Previous to his discharge, and on the morning of that day, the same man was employed in preparing food for, and feeding, the unprotected 15 heifers and 13 calves. A few days after, the disease developed itself amongst them, and in a fortnight they were all dead.

71. A crucial experiment has, therefore, been tried at this farm on the grandest scale. It was, indeed, supplied by accident, but it is none the less satisfactory and decisive. Although it far surpasses in magnitude any trial which an experimentalist dare institute, it fulfils every condition which could be demanded by the most rigid investigator. A farm is chosen in the very hotbed of Cattle Plague. The cattle on it are divided into two lots; 45 being placed

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in disinfected houses, and 28 in undisinfected open sheds. The disease is brought into each lot, on the same day, by direct inoculation of the virus. Of the disinfected animals, only those actually inoculated fall a prey, whilst of those which are not protected by disinfection, the whole are rapidly swept off.

It is scarcely possible to say anything which will add to the satisfactory nature of these results : but I may mention, that, of the ten farms immediately surrounding Mr. Lowe's, seven have lost the whole of their stock (amounting to 215), whilst on the remaining three the plague is gradually spreading through the herds.

Mr. Tollemache's Farms, Cheshire.

72. On the 28th of February I visited Peckforton Castle, at the courteous invitation of J. Tollemache, Esq., M.P. for South Cheshire. Owing to the long continued severity of the disease in this part of the county, the only available farm, on which I could try the value of the disinfection plan, was the Home farm at the foot of the Castle Hill. I attribute the immunity which this farm has hitherto enjoyed, to the protection afforded by the height and well-wooded character of the rock guarding it on one side, and also to the care and strict isolation to which the cattle are subjected. About 10 milch cows are kept in one house, and an equal number of cattle in a field and in open sheds. At the time of my arrival, Mr. Tollemache considered that his herds were in imminent danger, the disease existing all round, and rapidly advancing towards his farm in three directions ; a row of small cottages, each having one cow, formed a train connecting a diseased farm, about half a mile off, with the Home farm. Adjoining Mr. Tollemache's farm, and forming in fact part of the same establishment, are some cattle belonging to Mr. Smith, the sheds of which are within 50 yards of Mr. Tollemache's sheds. Attention was first directed to the house containing Mr. Tollemache's best milch cows, which was thoroughly cleaned, whitewashed, fumigated with sulphur, and freely sprinkled with carbolic acid. Sacking soaked in the acid was hung up in different parts of the shed, and the water supplied to the cattle was likewise impregnated with it.

73. Beyond sprinkling carbolic acid about the sheds, no disinfection was attempted with the other cattle, it being considered difficult to guard them from infection, so long as they lay out in fields and open sheds (68.).

The small cottages were then visited. Their cow-houses were whitewashed, sulphured, and treated with carbolic acid in the usual way. A sufficient supply of the acid was left at each cottage, with full instructions for its use. Nothing was done to the cow-houses of Mr. Smith, who professed little faith in disinfection.

74. The disease still advanced steadily towards the Home farm, and on the 12th of March one of Mr. Smith's cows was attacked : she was not removed, but kept in the same house with the healthy ones. Then, for the first time, carbolic acid was used in the shed, but in very sparing and insufficient quantities. The disease spread, and at the present date five have died and three recovered.

75. Up to the 26th of March the whole of Mr. Tollemache's cattle remained in health. On that day, however, a young bull, lying in the open yard (one of the lot which had not been disinfected), was thought to show symptoms of illness ; it was put into a shed by itself, and on the 28th it died of the plague. No other case of disease has since occurred amongst the cattle lying in the partially disinfected, open sheds, and as a month has elapsed since this bull died, the period of incubation has long passed, and it is certain that no germs of plague from that source are lurking in the systems of the remaining animals.

On 7th of April one of the milch cows was taken ill in the disinfected shed ; however she recovered in few days, and is now amongst the other cows and gives as much milk as before. This case is easily accounted for, as since the 12th of March the milch cows have been exposed to several cases of disease within 50 yards on one side of them at Mr. Smith's (72)., whilst at the latter end of March a bull actually died of the plague within a few yards of their shed. Notwithstanding the care which doubtless was taken to avoid communicating infection from the sick to the healthy animals, the virus may easily have been carried to one of the milch cows whilst they were being driven across the yard to water, as was done once or twice a day.

76. Even the wonderful disinfecting powers of carbolic acid are probably put to too severe a test, when it is expected to preserve cattle from taking the disease brought to them in so direct a manner as was the case on this farm ; but it may be considered as almost proved (56. 69. 75.), that when the plague does enter a shed which for some time past has been properly disinfected with carbolic acid and sulphur fumigation it loses much of its virulence and is deprived of its infectious character.

All the cows at the small cottages, which have been disinfected since the beginning of March, remain healthy, although they are now quite surrounded with the disease, and are even more exposed to the danger of infection than are those at the Home farm.

PART IV.

Experiments on the Injection of Antiseptics into the Blood of diseased Animals.

77. Although perhaps there is no actual cure as yet known for the Cattle Plague, any more than for smallpox and similar diseases, yet on theoretical grounds it appeared not improbable that good might be done by injecting various antiseptics into the blood (49.). If the disease depend on a change in the blood, analogous to fermentation (8.), induced by the presence of certain virus-cells, it appeared likely that such antiseptics as sulphite and bisulphite of soda, or carbolic acid and its homologues, might stop this action, if they were introduced in adequate quantity, without acting injuriously on the health of the animal. Professor Polli, Dr. De Ricci, Dr. M'Dowall, Dr. Waters, and others, have advantageously used sulphites and bisulphites as prophylactics and cures in zymotic diseases. Viewing the matter solely from a chemical point of view, it appeared feasible that, as I had successfully attacked the floating germs of the disease by atmospheric disinfectants, so I might neutralise the virus in the blood by the introduction into it of appropriate antiseptics. The experiments have been tried upon too limited a number of animals to be worth much. I, however, put all these trials on record, as the results may prove of some service to others who may be enabled to continue them.

78. The first experiments were performed on the 2nd of March at Mr. Findlow's, Wardle Hall, Cheshire, on two heifers in calf, just taken ill. The temperature of the animals per rectum was, No. 1. 106°·2 Fahr., No. 2. 106°·1 Fahr. The jugular vein having been opened with a fleamby Mr. Dunn, veterinary surgeon, (to whose assistance in these experiments I am much indebted), the flow was stopped by pressing the finger on the distal part of the vein, whilst I inserted the nozzle of an injection syringe (specially made for this purpose) into the vein, pointing towards the heart. The liquid injected consisted of half an ounce of sulphite of soda dissolved in three ounces of water. The temperature of the liquid and syringe was as near as possible 100° Fahr., and the act of injection was performed very slowly ; particular care being taken to avoid injecting air into the vein. The vein was then fastened up by the surgeon. Two or three men were necessary to hold the animals, as they struggled somewhat, but as soon as the operation was over they seemed as well as before, and suffered no inconvenience from it. The next day the animals were certainly no worse than they were on the previous day, and their temperature had diminished, No. 1. being 106° Fahr., and No. 2. 104°·8 Fahr.

79. The good effect of the injection now seemed exhausted, the heifers rapidly got worse and in a few

days died. The disease had visited this farm very severely, only 16 cattle having been saved out of 107.

Mr. Singleton's Farm, The Rookery.

80. The disease on this farm was also very virulent. Of an original stock of about 60 not one of those attacked had recovered. At my first visit over 40 had been buried, and the rest were going rapidly. I was anxious to try the effect of injecting sulphite of soda, and for this purpose, on the 2nd of March, Mr. Singleton kindly placed at my disposal four two-year-old heifers which had shown first symptoms of illness that morning. The experiments at Mr. Findlow's having

83. Two things are clearly shown by this table. In the first place, the course of the disease was decidedly checked. In Mr. Singleton's painfully acquired experience of the effect of the plague, such an occurrence as this had not happened before. In almost every case the course of the disease had been remarkably uniform. An animal was observed to show signs of illness one morning, the next day it was worse, and on the third or fourth day it invariably died. Now Mr. Singleton himself pronounced each animal treated by injection better the next day, and a reference to the table shows that the thermometer confirmed this decision. Moreover, the amount of

SUPPLEMENT TO REPORT OF EXPERIMENTS AT Mr. LOWE'S FARM, SMETHWICK HALL, CHESHIRE.
(Paragraphs 68 to 71.)

Accident has carried this grand experiment a step further, with the most striking results. A few weeks ago, the remainder of Mr. Lowe's 45 disinfected animals were turned out to grass, and at the same time were removed from the protecting influence of the carbolic acid. Within a few days the Plague attacked and killed the whole of them. The complete proof of the value of carbolic disinfection which has been afforded at this farm is cheaply purchased at the loss of all Mr. Lowe's stock.

May 11th, 1866. W. C.

[illegible] calf, No. 1, taken ill that morning, its temperature being 106°, was then injected with one ounce of sulphite of soda. In this case it was intended to inject it with another ounce the next day.

81. Sulphite of soda producing no injurious action when added to the blood (even if it did but little good), it was determined to try bisulphite of soda, on calf No. 8, its temperature just before the operation being 104°.

On the 6th of March I found No. 3 dying; No. 6 about the same as the day before, and Nos. 7 and 8 decidedly better. Their temperatures were :—

No. 3. -	98°·5 Fahr.	No. 7. -	104°·0 Fahr.
„ 6. -	102·4 „	„ 8. -	100·4 „

No. 3 died the same day. Nos. 6 and 7 had each one ounce of sulphite of soda injected into the jugular vein on the other side of the neck; and No. 8 had half an ounce of bisulphite of soda again injected into it.

I was now obliged to leave this part of the country for some days, and, on my return, I found all my patients dead.

82. The following is a tabular statement of the progress of these cases :—

TABLE showing Results of injecting Sulphite and Bisulphite of Soda into the blood of Animals suffering from Cattle Plague.

Number.	Substance injected.	Temp. just before injection.	2d Day.	3d Day.	4th Day.	5th Day.	—
		°F.	°F.		°F.		
1	½ oz. of sulphite of soda.	106·2	106·0	—	—	Died.	
2	½ oz. ditto -	106·1	104·8	—	—	Died.	
3	¾ oz. ditto -	105·2	102·8	—	—	98·5; died this day	
4	¾ oz. ditto -	104·2	103·7	Died.			
5	½ oz. ditto -	104·0	101·9	Died.			
6	¾ oz. ditto -	102·6	100·8	—	101·2	102·4; 1 oz. of sulphite of soda	Died on 6th day.
7	1 oz. ditto -	106·0	104·0; 1 oz. of bisulphite of soda	—	—	—	Died on 6th day.
8	½ oz. of bisulphite of soda.	104·0	100·4; ½ oz. of bisulphite of soda.	—	—	—	Died on 6th day.

been kept in disinfected sheds, and received careful nursing and appropriate medical treatment during the progress of the trials,—some, if not all of the cattle under experiment, would have been permanently cured.

Injection of Carbolic Acid.

85. This was tried at first very carefully, and in dilute solution; the extraordinarily energetic action exerted by it on vital phenomena, rendering it not unlikely that its direct addition to the blood of an animal already weakened by the disease, would be rapidly fatal. The first experiment was tried at Mr. Fenna's, near Beeston. Three ounces of a solution of carbolic acid, containing one per cent., were very slowly and cautiously injected into the jugular vein of a heifer (No. 9) just beginning to show signs of the disease. It appeared no worse for the operation. The next day it seemed about the same; but Mr. Fenna, having in the meantime obtained some medicine reputed to be infallible, was unwilling to allow me to continue the experiment.

86. At this farm I was fortunate enough to find a severe case of the plague in a small, well-closed shed. The peculiar odour attending the disease was most offensive. I spent several hours in this shed examining the atmosphere, and collecting specimens as formerly at Mr. Daniel's (49 *a. b.*) Infected air was also drawn over microscopic slides moistened with glycerine. The specimens here obtained were forwarded to Dr. Lionel Beale for microscopic examination.

87. I was courteously allowed to make several trials of carbolic injection at Mr. Dutton's farm, near Peckforton; the experiments took place on the 13th of March, and five cows were subjected to the treatment. Emboldened by the previous result (85.), I worked on this occasion with a solution of pure carbolic acid containing four per cent. The first cow (No. 10.) was injected with 1½ ounces of liquid, containing 26¼ grains of the pure acid. It is probable that this injection was rather too rapidly performed, for the animal appeared distressed by it, and trembled all over; in about three minutes, however, she quite recovered the temporary ill effects.

Mr. Crookes.

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It appeared evident that if harm were to follow the injection of carbolic acid the mischievous effect would be immediate; but that if the fluid could pass through the heart, without exerting its paralysing action on that organ, and could get into the circulation, no present ill effects need be anticipated. I therefore determined to push these experiments as far as possible, increasing the quantity of carbolic acid until it produced a fatal result.

88. The next operation was on cow No. 11, in which three ounces of solution (containing 52½ grains of pure carbolic acid) were very slowly injected. No bad effect followed.

89. Increasing the dose, cow No. 12 had injected into her vein, 4½ ounces of solution (equal to 78¾ grains of carbolic acid); this also was followed by no immediate ill effect.

90. Cow No. 13 was then treated with six ounces of solution (containing 105 grains of pure carbolic acid) in two portions of three ounces each; five minutes interval elapsing between each injection. The first three ounces produced a slight trembling, but not so severe as in the case of cow No. 10; as she seemed better in a few minutes, the second dose of three ounces was injected. This proved too much, or was pumped in too hurriedly; for almost before I had finished, the animal trembled violently, its eyes projected, its breathing became laborious, it fell down and expired.

The result could scarcely be attributed to the accidental injection of air into the vein, for the distress began with the injection of the first syringefull, and was only increased by the second; nor is it likely that this accident would happen twice consecutively. I was particularly careful on this point, and the construction of the instrument rendered such an occurrence scarcely possible with ordinary precaution. It is probable that the injection was performed too rapidly, or that the vital powers were lower than usual.

91. In the case of the remaining animal, No. 14, I decided to inject as large a dose as it would bear, stopping the operation at the first sign of trembling, and delivering the liquid very gradually. The first syringe-full caused no bad symptom, and I had just finished injecting the second dose when trembling commenced. It was rather violent for a short time, but soon went off, and in five minutes the animal appeared as well as before. This cow, therefore, bore without inconvenience, the injection of six ounces of a four per cent. solution, containing 105 grains of pure carbolic acid.

Careful observations with the thermometer were taken before each operation. There were no more diseased beasts on the farm, or I should have carried my experiments still further.

92. On visiting the farm the next day, I was told that all the animals seemed better, and on testing them with the thermometer (93.), that statement was confirmed. I gave directions that each animal was to be drenched with half a wine-glassful (one ounce) of carbolic acid in a quart of warm water every morning; but in other respects they might be treated, as Mr. Tomlinson, a skilful cow doctor, should direct.

Business now calling me to London, I was unable to watch the further progress of these cases; this is to be regretted, as a series of daily thermometric observations would have been of great value in suggesting further experiments. I had, however, frequent accounts sent me. Cow No. 14 continued to improve slowly, until convalescent. She is now quite well. Nos. 10, 11, and 12 remained in apparently the same state for four days; they then changed for the worse and died. It is not improbable, that, had I been able to inject a further quantity of carbolic acid, during the four days in which they were thus hovering between recovery and relapse, it would have turned the scale, and some of them, at all events, would be now alive and well.

93. The following table gives the thermometric observations:—

TABLE showing Results of injecting Carbolic Acid into the Blood of Animals suffering from the Cattle Plague.

No.	Grains of Carbolic Acid injected.	Temperature before Injection.	2d Day.	3d Day.	—
		° F.	° F.		
10	26½	105·4	103·8	Better.	Died on 6th day
11	52½	103·8	102·8	Better.	Died on 6th day
12	78¾	104·8	104·4	Better.	Died on 6th day
14	105	103·7	103·1	Better.	Recovered.

94. If future experiments prove that injection of carbolic acid, or other antiseptic, will do good, it is an operation very easily performed (78.). I have injected five animals, and taken thermometric observations within an hour. Sulphite or bisulphite of soda apparently occasion some pain, as the animals struggle very much. With carbolic acid, I found them tolerably quiet.

95. I have calculated the proportion which the carbolic acid bore to the whole quantity of blood in these operations. Taking the total amount of blood in the animal at 150 pounds, there were injected into—

No. 10, one part carbolic acid in 40,000 of blood.
„ 11 „ „ 20,000 „
„ 12 „ „ 13,300 „
„ 14 „ „ 10,000 „

It is worth mentioning, incidentally, that in the case of cow No. 14 (which recovered), the proportion of carbolic acid, injected into the blood, would have been enough to keep from decomposition the whole quantity of that liquid for a considerable time. In Nos. 10, 11, and 12 the proportion of carbolic acid would probably not have been sufficient for that purpose.

96. I am informed by Dr. Calvert, that cresylic acid has much less coagulating power on albumen than carbolic acid, and my own experiments (37) entirely confirm this statement. I have now in preparation in my laboratory a quantity of cresylic acid in a state of purity, to be employed as an injection, if further opportunities of prosecuting these inquiries be afforded me. Xylic acid, the member of the same series, above cresylic acid, is also under preparation. This is also a powerful antiseptic, and it is possible that further investigation may show that this body possesses other valuable properties.

Conclusion.

97. In concluding the report of my experiments, I cannot avoid expressing regret that they are not more complete. Had more time been at my disposal, I hoped to have been able to settle certain important questions, relating to the laws of infection, which are necessarily only imperfectly treated in this report.

Experiments of this kind necessarily occupy much time. Weeks have been spent in the fruitless endeavour to find appropriate spots, where satisfactory experiments could be performed; and when all has been arranged, longer time has elapsed before any result could be established, during which period the experiments required unremitting watchfulness, to guard against the manifold sources of error.

98. Were time and opportunity allowed me for prosecuting these researches, I would point out the following experiments, as being likely to yield valuable results:—

a. Continue the examination of the action of carbolic and cresylic acids on insects, animalcules, and microscopic animal and vegetable organisms, and extend it to xylic acid and other powerful antiseptics of this class, such as eugenic acid, methyl-oxy-phenic, and methyl-oxy-cresylic acids, &c. (36. 39. 40.).

b. Try various methods of readily disinfecting sheds, cattle trucks, &c. It is probable that the liquid. pulverisers, as used for the inhalation of medicated liquids, would rapidly diffuse carbolic acid, pure or in solution, wherever its action was needed. The employment of this instrument will also give the means of employing non-volatile disinfectants, such as permanganate of potash, per-chloride of iron, and other metallic salts, for purposes of atmospheric disinfection.

c. Examine the atmosphere from different parts of infected sheds, with standard solutions of permanganate of potash, and estimate quantitatively the organic matter therein contained (57. *d.*).

d. Draw infected air through gun cotton, and afterwards dissolve the latter in ether, or other appropriate solvent, and examine the residue under the microscope (57. *b.* 86.).

e. Collect the exhaled breath from diseased animals, and cause healthy animals to breathe it. (This experiment must be carefully arranged, so as to avoid communicating infection by other means than through the lungs.)

f. Draw infected air from sheds, and the breath of diseased animals, through spiral glass tubes, artificially cooled with ice, or by Krohne and Seseman's ether spray apparatus, as used for local anæsthesia. Examine the condensed liquid chemically and microscopically (57. *c.*).

g. With the condensed liquid obtained in the last experiment, inoculate healthy animals, both before and after mixing with it carbolic acid or other antiseptics.

h. With the liquid collected from the eyes and nostrils of diseased animals, inoculate healthy animals ; both before and after mixing with it various quantities of carbolic acid or other antiseptics (42).

i. Inoculate healthy animals with infected cotton wool, obtained as in experiment *d.* Repeat this, after exposing the infected wool to the vapour of various antiseptics (43. 57. *b.*).

j. Try if the infection is produced through the stomach by adding to the food infected liquids.

k. Try if the infectious matter is on the skin, by washing a portion of it, and inoculating a healthy beast with the liquid.

l. Condense the volatile matter of the fæces of diseased animals, and try if the infection is present in it.

m. Examine the gas which collects under the skin in cases of emphysema, chemically, microscopically, and in relation to its power of communicating infection.

n. Continue the experiments on injecting antiseptics into the blood of diseased animals (77. to 96.). In this manner, try the action of sulphites, bisulphites, hypophosphites, and the substances mentioned in experiment *a.* The injections can be repeated several times on the same animal, by tying in the vein, a tube furnished with a stopcock.

o. Repeat, several times, the experiment of placing together in the same shed a healthy and a plague-stricken animal, and endeavour by any method which promises best to save the diseased animal from death, and avert the pestilence from the healthy one. Previous experiments (56. 65.) show that the favourable solution of this problem is far from unlikely.

p. Try the preventive and curative effect, once or oftener in 24 hours, of submitting the animal for a certain time in a small chamber filled with strong disinfecting or antiseptic vapour, so that the whole current of the blood and substance of the tissues may be speedily and strongly impregnated with it (46.).

q. Repeat some or all of the foregoing experiments on sheep ; and try any fresh experiments which may be suggested in the course of the inquiry.

Experiments *g*, *h*, and *i* will show beyond a doubt whether the virus of Cattle Plague is destroyed by carbolic acid. Valuable information would be gained by occasionally pushing the experiments *n* and *p* to a fatal issue. It is probable that the carcase of a diseased beast, killed by either of these experiments will be found to be efficiently disinfected ; and should this prove to be the case, the administration of a fatal dose of disinfectant will usefully replace the poleaxe.

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99. In dealing with the Cattle Plague it is possible to try testing experiments of a nature wholly inadmissible where human beings are concerned ; and thus it is feasible to suppose that from the lessons derived from this pestilence we might obtain insight into means of preventing, or even curing, zymotic diseases. Thus the theoretical views, the experiments, and results recorded in the preceding pages, possess an interest beyond the immediate sphere of Cattle Plague. They point forcibly to the possible prevention and cure of all zymotic diseases which attack the human race, and thus possess a far wider and more momentous significance, than if they related only to cattle. Every argument brought forward, every experiment detailed, and every result obtained in the course of this investigation, apply with overwhelming force to such visitations as typhus and typhoid fever, smallpox, diphtheria, and to that terrible scourge which for some time past has been threatening our shores.

100. The free use of the disinfecting agents here pointed out might not only save the country from the ravages of this pestilence, but it would ameliorate the physical condition of the people. Although foul sewage and putrefying animal matter are probably insufficient to generate the first septic germ of zymotic disease, there can be no question that when such diseases do attack a population they spread with the greatest virulence wherever such putrescent materials abound. Highly important results might be expected to follow the general use of antiseptics, whether applied to farm buildings, where large quantities of manure are produced, or to sewage, whatever its destination,—whether allowed to fester in cesspools, pollute our rivers, or return to the soil. In tracts of land to which sewage, disinfected with carbolic acid, has been applied, the sheep are free from foot rot, the potatoes from disease. Obnoxious insects, such as turnip-fly, gnats, and dung-flies, are absent ; and grubs, larvæ, and the lower forms of animal life, and infusoria (the invariable accompaniments of putrefying matter) disappear ; whilst vegetation becomes remarkably healthy and luxuriant. It is also highly probable that those imperceptible, but injurious emanations from the soil, known as malaria, would be destroyed, for Dr. Angus Smith* has conclusively proved, that the putrefactive decomposition in soils, which produces malaria, does not take place in presence of very minute quantities of carbolic acid ; and Dr. M'Culloch has shown that the unhealthiness of many parts of England may be traced to such exhalations. It therefore may be expected that, by extending the sphere of operation of these preventive appliances, we may not only diminish the loss of much valuable property and much sustenance of the people, but even diminish the risk and extend the term of the natural life of man.

April 25th, 1866. WILLIAM CROOKES.

* On the Production and Prevention of Malaria, by Dr. R. Angus Smith, F.R.S.—Memoirs of the Literary and Philosophical Society of Manchester, vol. i., 1861.

On the Treatment of the Cattle Plague.

REPORT TO HER MAJESTY'S COMMISSIONERS

BY

GEORGE VARNELL,

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AND

WILLIAM PRITCHARD,

ASSISTANT PROFESSOR AND DEMONSTRATOR OF ANATOMY, ROYAL VETERINARY COLLEGE, LONDON.

Professors Varnell and Pritchard.

Report to Commissioners.

The time allotted to us by the Royal Commission for preparing this Report has been found far too limited to admit of our elucidating all the points we contemplated investigating at the onset of our inquiry, for as we progressed modes of procedure other than those employed suggested themselves.

The treatment also as applicable to all other known diseases in cattle seemed, and indeed has proved, of but little, if any, avail in this affection.

The symptoms of Cattle Plague vary in intensity and in regularity, nevertheless those that are present in every instance are singularly typical of this peculiar disease. It is comparatively easy, therefore, to form a diagnosis, and with reference to a prognosis, although we are able to predict in a very large majority of cases what will be the result, our ability to do so is not through a deduction drawn from a knowledge of the pathology of the disease, but from our experience of its almost uniform fatality.

As regards the treatment of those cases we had the charge of, it has been, as a rule, unsuccessful, even more so judging from the reports we have seen and heard than that resorted to by many practitioners in the country. That these gentlemen have been more successful than ourselves we believe is possibly true to some extent, and may be accounted for in two, or perhaps in three ways. In the first place, the cases we treated have been sent to us by inspectors from different parts of the metropolis, and as a rule the malady had far advanced before our patients arrived. In the second place the disease had thoroughly declared itself in the animals forwarded to us before they were removed from their sheds. In this condition they were carted a considerable distance to the college, and on arriving there they were often so much exhausted that some of them died very shortly after. In the third place the atmospheric and other influences existing in the country would no doubt favour the recovery of many animals that would succumb to the disease if placed in a more confined situation.

The recovery of plague-stricken animals, whether submitted to our treatment or to that of others, whether living in town or in the country, has not in our estimation been due to medicine, except, perhaps, to a very slight extent.

Opinions with reference to the nature of the disease passed through many phases from the period when it first broke out in this country to the present time. It was called Rinderpest by some; an appellation which in a very common sense is perhaps true, if fully explained, but nevertheless a term which did not give the slightest clue to the pathology of the disease. By some the malady was considered typhoid, by others typhus in its nature, and we thought for a time that there were strong grounds for the correctness of these views. Morbid anatomy, however, did not sanction the adoption of either term to the full extent of its pathological signification. We at first based our mode of treatment on the assumption that the disease was either typhoid or typhus, but the results of such treatment were in every instance unsatisfactory, so that we were eventually induced to think that the disease, as far as its nature was concerned, was neither the one nor the other. At this stage of the investigation we had reasons for viewing the disease in quite another aspect; circumstances occurred which induced us to look upon the affliction as exanthematous in its nature, but this notion had not its full weight with us until it was confirmed by Mr. R. Ceely, M.R.C.S., of Aylesbury, whose opinion on eruptive fevers is of the greatest value. As the terms Rinderpest and Cattle Plague did not indicate in any manner whatever the mode of treatment to be pursued, and as tradition only informed us that such affections were incurable, we were deprived of even the light of experience to guide us as to what course we should take. After a time, however, having got some idea of the class of disease to which we conceive the one in question belongs, we were enabled to take more rational views as to the course we should pursue. We are confident even now that we have not discovered a cure for the affection, but we hope, as the character of the disease is more intimately understood, that preventive measures will be attempted with a far better chance of success than hitherto.

Believing that we have an eruptive fever of a highly contagious and malignant nature to contend with, and feeling persuaded that such affections must run their course, all we can do is to facilitate their doing so with as little interruption to the health of the animal affected as possible. To effect this end drugs are found to be of but little use; still they are not to be wholly discarded. We have asked the question, what is the "Rinderpest" of the steppes of Russia? It may perhaps be a modified form of the same disease as, or even identical with, the one which now exists in England. We cannot assert that it is not so, only so far as we are unable to find, from the descriptions given of it, that it possesses those peculiar characteristics we have observed it to possess in this country. They certainly do not correspond with those described in the Report drawn up by Professor Simonds and Mr. Ernes on their return from the continent in 1857, whither they had been for the purpose of investigating the nature of Cattle Plague. It is possible, however, that had those gentlemen remained longer in the country where this disease then existed, and had they enjoyed the same facilities for investigating it that we have had of the one now existing in cattle in this country, they would have discovered and described a disease bearing a stronger resemblance to the latter as regards the symptoms, *post mortem* appearances, and also the capability of its being communicated with ease to other animals, such as sheep and goats, than they have done. The very name "Rinderpest," by which a disease in Russia is designated, is calculated rather to mislead than to assist in directing the mind to its true pathology.

In the present outbreak, although the disease is highly malignant, and almost always fatal, yet it assumes a milder form in some few districts than in others, or even in the same districts at one time than at another, and that such really happens we shall be able to show as we proceed with our Report. In some districts we have heard of comparatively large per-centages being saved; but those persons under whose care the animals were placed candidly stated that the recoveries were not to be referred to the effects of medicine, but to the cases being mild ones.

We have not been able to determine whether this disease is more prevalent on high table lands than in low districts. For a time we thought the former

locality favoured an exemption from the malady, but we have since had reason to think that such is not the case; the returns, however, to the Privy Council would determine this question.

Varieties of Breeds.—Particular breeds of cattle show no immunity from this disease. We have observed it in the Alderney, the Brittany, the Dutch, the Italian, and the English; the latter in our opinion are less able to bear up against its attacks than any one of the others, and the higher the animal is bred the sooner it succumbs. We cannot assert that the Dutch are less liable to be attacked by the disease than other breeds, but as a rule we have found that they live longer, and more of them recover than of the other varieties.

Age seems to have no effect in rendering an animal less susceptible; cattle at all ages seem equally liable to an attack. If there is any difference in this respect we are inclined to think that weakly yearlings are most predisposed to be affected.

Sex, as far as we have been able to detect, has no influence in producing a greater predisposition to be affected in one kind than in another.

Previously to the 20th of October 1865, the date of our being appointed by the Royal Commission to investigate and report on the symptoms, progress, treatment, both curative and preventive, of the Cattle Plague, we had treated about 20 cases in the College infirmary, and similar success attended our efforts, then as now, so that experience seems to be no avail in discovering a remedy.

The suggestions for the treatment of Cattle Plague have been as varied in kind as they were numerous in quantity, but whether they have emanated from veterinary surgeons, or from practitioners of human medicine, they have proved equally inefficient.

Information received from the Country.

In October 1865 we visited the farm of Capel Cure, Esq., Blake Hall, Essex, for the purpose of examining his herd of cattle, among which the plague had broken out. This gentleman had already lost one; the rest we examined, and found that many of them exhibited well marked symptoms of the disease. One of the worst we caused to be killed, for the purpose of examining its viscera, the morbid appearances of which fully confirmed the opinion we had formed. Those that were ill were being treated by a farrier, who informed us of the nature of his treatment, and certainly a more heterogeneous compound than that which he prescribed cannot be imagined. He candidly stated "that he was doubtful if anything would do "the beast any good, but he was anxious to do some-"thing."

The great losses of cattle, and afterwards of sheep, sustained by R. Harvey, Esq., M.P., on his estate near Norwich, are proofs as positive of the highly contageous nature of the disease as could possibly be adduced, nor have we seen a better opportunity of studying the symptoms of the disease on a large scale than we had at Crown Point (Mr. Harvey's Park) during last October. Here we saw sheep affected with the plague in all its stages, from the first signs of sickening with an attack to dissolution. Some animals would be observed in the very early stages of the affection, lingering behind the remainder of the apparent healthy flock. Such of them as acted in this way were not disposed to eat, and seemed unable to keep pace with the rest. Others affected with the malady in a more advanced stage would be found lying one here and another there, having been left by their associates; these, if disturbed, would rise and attempt to follow on, but before reaching their companions would fall from exhaustion. Then, if such animals were more closely examined, they would be found to have a slight discharge from their eyes, the lids of which would be reddened, their ears would hang down, and their breathing would be disturbed. Others in a more advanced stage would be found in some secluded spot, as if intentionally selected, where to finish their loathsome existence undisturbed. In such instances the symptoms would indicate their hopeless condition; their breathing would be much affected, the respiration being performed with a distressing moan accompanied with a peculiar grunt; and they would be covered with blue flesh-flies. The odour from their bodies and from the copious fæcal discharges were extremely offensive, the latter frequently covered with a bloody mucous, and the visiable mucous membrane of their eyes, nostrils and mouth of a dark purplish red aspect. In addition to this desolating scene, might be observed at some distant part of the park the dead cart going its round collecting the carcases of those that had but recently died, to convey them to the burial place, where already about eight hundred had been within a very short time deposited in deep pits.

We made several post-mortem examinations, and the nature of the morbid parts left no doubt on our minds with respect to the disease from which they had died being identical with that affecting cattle, and termed Cattle Plague.

The grass on Mr. Harvey's park was unusually dry as well as very much blighted, and we were told that there was a scanty supply of water. To these circumstances some people attributed the disease in the sheep, but in this opinion we did not concur, and certainly our experience on the following two days strengthened our non-concurrence with this assertion.

The day after we had inspected Mr. Harvey's sheep we visited a farm near Colchester, Essex. There we also obtained conclusive evidence of the contagious nature of the disease, and also of its being transmitted from cattle to sheep, and the converse. The proprietor of this farm bought some sheep in Colchester Market, which soon afterwards proved to be a part of an infected flock. These soon conveyed the disease to his cattle, all of which, with the exception of one, died. Twenty-two well marked cases of the disease among his sheep were shown us. One of them that had but just died, and one that we had destroyed, were examined *post-mortem*, as we did also a heifer that died during the night, and the morbid appearance of the viscera of both sheep and heifer satisfied us that they died from Cattle Plague.

The food these sheep were being fed upon was quite different from that upon which Mr. Harvey's sheep had been partaking of. In this instance they were folded upon young green turnips, quite free from mildew; they had also some bran, and a small quantity of oil cake daily.

The day following we inspected the sheep on another farm about twelve miles from Colchester, where we found a number of very strong two-year old ewes. Many of these were labouring under the disease (Cattle Plague); some were actually dying, and two had died early in the morning. We examined the carcases of two which fully confirmed our statement. We were informed that these ewes had caught the disease from some bullock that had died of the Cattle Plague on some farm, previously to the sheep being attacked. The food of these ewes was quite succulent in its nature, and they had free access to water. We consider the experience we gained on this farm valuable, inasmuch as it proves that older sheep than Mr. Harvey's (which were only "hoggets"), even if well fed, are not exempt, and it is a third proof that sheep can contract the disease from cattle.

On the 11th of November we visited Aylesbury, and through the kindness of Robert Ceely, Esq., M.R.C.S., and Mr. Lepper, M.R.C.V.S., we were enabled to see several very interesting cases of Cattle Plague. Some of them presented symptoms of a peculiar nature, such as we had not before witnessed, and which to a very great extent influenced our future mode of proceeding. These peculiarities had been previously noticed both by Mr. Ceeley and Mr. Lepper. The former gentleman attached considerable importance to them. They consisted in the skin being covered with *crusts* or *scabs*, the result of an eruption.

The first case we saw at Aylesbury was a white short-horn cow, which was under the charge of Mr.

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Lepper, who informed us that she had been affected in a mild degree, and that the eruption on her skin made its appearance a few days after she was attacked. On making a careful examination we found many crusts, more especially on the udder teats, inside the thighs, and to a less extent on other parts of the skin. In many places on the teats the crusts had fallen off, but the places where they had been were indicated by light rings with slightly depressed centres.

The next case of Cattle Plague we saw was one out of several that had a fatal termination. The cow here referred to had had the disease in a mild form only, and Mr. Lepper thought she would have recovered. Many parts of her skin were covered with irregular crusts, those on her udder being the most perfect in form.

About one mile from Aylesbury we were shown four calves which were labouring under the disease: one was dying; the others were mild cases, and we have been since informed that they recovered. The eruption on the skin of these calves was more extensive than we had hitherto seen it on any beast, and on one of them their shapes were well defined. The man who fed them said that the eruption on their skin broke out about three days after they were taken ill. Two of these calves presented a very singular appearance; the discharge from their eyes and nostrils was very copious; from the eyes it actually streamed down their cheeks, and yet they seemed to suffer but little, for they were chewing their cuds and in other respects appeared to ail but little. The owner of these calves had lost some cows, but he said he could form no idea how his stock had contracted the disease, as no stock of any kind had been near them for a great distance.

We next inspected a case in the cowshed at the Union Workhouse, which exhibited the malady in its last stages. There was no eruption on the skin that we could detect, and we should not have alluded to this case but for the fact of the animal's position being so extremely isolated that no one could form an idea as to how she contracted the disease. There were two cows on these premises both healthy at the time we were there, but we have since heard that both of them have since taken the disease and died.

We next visited a farm about half a mile from any road, and to get to it we had to cross some meadows. Four well-marked cases of Cattle Plague were shown us in different stages. All of these animals have since died. On their skins we found a large number of crusts, and, like those we had previously examined, they were more numerous and better defined on their udders than elsewhere.

We saw other animals that were affected by Cattle Plague, but as they presented no peculiarities differing from those we had already seen we shall not record them. Our principal object in paying this visit was to examine the nature of the reported eruption on the skin of cattle affected with Cattle Plague, and which has no doubt, through the sagacity of Mr. Ceely, proved an important feature in the pathology and treatment of the disease.

Quite by accident we learned that some tanners in Norfolk had observed that the skins of cattle which had died of the plague were to a certain extent injured by the disease. This hint had had so important a bearing in connexion with the eruption noticed first by Mr. Ceely, that that gentleman was induced to make some inquiries respecting it. The following is a reply to his communication, from Mr. Leamon, a tanner in Norfolk. "From his experience "as a tanner, spots or small festers are to be seen on "the *groin* or outer parts of the hides of all such "animals as die of the Cattle Plague in an advanced "stage; but on the hides of those killed when first "taken nothing can be seen. Most of the eruption "will be found on the head, shanks, and thinner "parts of the hides. The injured or festered parts "being made into low-priced leather, and used for "insoles, the fact of their being blemished does not "lessen the value of the hides materially. But as it "cannot be asserted that they are not somewhat "injured, those who buy them do so with an amount "of caution." In confirmation of the above statements we may mention that we have seen the same spots on the skins taken from cattle that have died in our infirmary, but not until our attention was directed to them through the above media.

On the 30th of November we were informed by the inspector's assistant of the Watford district that some cows, the property of Mr. White of Rickmansworth, had had the disease in a very mild form, but that after they were first attacked an eruption broke out on the necks, legs, and thighs, and that these parts were now covered with scales or crusts; others of Mr. White's cows that had not this eruption died of the Cattle Plague. Mr. Ceely visited Mr. White's farm, and examined the cows alluded to by the inspector's assistant, and found, as had been stated, that the cows necks and legs were covered with crusts.

December 11th. — We are informed by Mr. Ceely that he had some pieces of skin sent him by Mr. Gooch and Mr. Leamon of Reapham, Norfolk, which showed patches of roseola; also a piece of partly tanned skin which distinctly showed marks of previous vesicles.

December 23d.—A red and white calf died from the Cattle Plague in the college infirmary, and on examining its skin it was found to be covered with an intense rash. When the hair was removed by scalding, the surface resembled the skin of man affected with intense erysipelas. Eruption on the skin must be looked upon as one of the most important features of the disease, it being the key to the true pathology of the affection, and at once establishes it as one of the varieties of eruptive fevers which experience has proved to be of the most malignant kind.

An experiment was carried out by the Norwich medical committee on the estate of R. Harvey, Esq., by placing twenty freshly purchased healthy sheep with eighty of Mr. Harvey's original stock, a part of which was diseased at the time. In a very short period thirty *per cent.* of the latter and fifteen *per cent.* of the former died of the disease. Others also were ill when we saw them, namely, on the 4th of November, showing to the satisfaction of the committee that the disease is highly contagious.

On the 20th of November we visited Norwich for the third time. On arriving there we were informed by Messrs. Wells and Smith, veterinary surgeons, that some homœopathic practitioners had undertaken the treatment of some cattle affected with the plague, and that they were appointed by the committee to ascertain the nature of the proceedings of the homœopaths, and to select animals for them to treat. A large number of cases were shown them, but only eight were accepted as fair specimens upon which to test their treatment. Through the kindness of Messrs. Wells and Smith we were enabled to see these animals. They were undoubtedly decided cases of plague, and we formed the opinion that they would all prove fatal, which we subsequently heard was a correct one. All the cases we saw in the vicinity of Norwich on this occasion were of a very malignant type.

On the 25th of November we wrote to Mr. Shipley, M.R.C.V.S., of Yarmouth, Norfolk, for his opinion of the value of treatment, knowing from former correspondence that he had treated a great many cases. His reply is as follows:

12, Southtown, Great Yarmouth,
Dear Sirs. November 28, 1865.

In answer to your letter, I beg to inform you that I have treated or caused to be treated eighty-nine cases of Cattle Plague, but I am sorry to say with but little success, in fact, none, so far as medicine is concerned, for out of this number I find only twelve have recovered, and these I feel convinced would have done so by careful nursing without the aid of medicine. I have tried various remedies, amongst which are carbonate of ammonia, hydro-

chloric acid, chlorate of potash, arsenic, spirits of nitric ether, solution of acetate of ammonia, with many others, and perhaps I have found one or two cases recover, but as many as fifteen have died. I have seen some very bad cases recover that have not had any medicine at all. I attach much importance to sanitary measures, cleanliness, and well-ventilated buildings; warm clothing must not be lost sight of. As far as diet is concerned, I order them gruel, and when I can obtain it I give them milk. In many cases I have given rather large quantities of stout or strong ale, and I have thought with more apparent success than anything else; but I assign most of the recoveries I have witnessed to their being mild attacks, assisted, I have no doubt, by good nursing. Arsenic has been extolled, but I have thought, both in large and small doses, it has rather done harm than good. I have had two or three recover when treated with hydrochloric acid, but many have died. I have therefore come to the conclusion that as far as drugs are concerned we are perfectly helpless. The symptoms of the disease have varied. I do not observe that peculiar discharge from the nostrils and eyes that I witnessed when the disease first broke out, and I also find that the cases in the country bear up against the disease longer than in town. The week before last, I saw several very mild cases on one farm, but at the same place the week following it assumed a virulent form again. Last week it broke out in a cowhouse in Yarmouth, since which all the cows it contained (fourteen in number) have died. I shall be most happy to furnish you any information I can.

Yours respectfully,
Professor Varnell. WM. SHIPLEY, M.R.C.V.S.

Understanding that the foot and mouth disease affected cattle to an unusual extent in Mr. Shipley's district, we wrote to this gentleman to know if he had often seen this affection associated with Cattle Plague, and in due time the following reply was received:

Dear Sir, Yarmouth, December 19, 1865.

There is no doubt but eczema is often associated with Cattle Plague. I should have informed you of this before, but have been waiting the result of some cases under observation. I may first state, that some cattle which were bought in the Metropolitan Market on the 20th November were placed in a yard adjoining a shed containing some cows. On the 25th November I saw these cattle, and remarked that they ought not to have been so placed, as two of them had eczema, and perhaps Rinderpest as well. On the 3d of December one of the cows in the shed was unwell. I found her to be feverish, and I gave her some medicine. During the same day I was asked to look at another cow in the same shed which I found to be affected with eczema. I again looked at the cow I had seen in the morning, and found that, in addition to vesicles on the tongue, inside of the lips, and between her digits, that she was becoming the subject of Cattle Plague; and on Monday December 24th this disease was so well marked that I had her destroyed. The post mortem examination showed unmistakable signs of the plague. On the 9th of December the other cow, which, as before stated, had the foot-and-mouth disease in a well-marked form, was now the subject of Cattle Plague. On the 10th she was much worse, and on the 12th she died. The disease in this case was very malignant indeed; there was a papular eruption on the perinæum.

All the cows, nine in number, sickened with the plague on the 9th and 10th, with the exception of one, and she became the subject of eczema, having large vesicles all over her tongue, inside of her lips, on her udder and teats, and between her digits. On the 15th this cow fell off her food, and ceased to give any milk, and is now suffering from Rinderpest, and I fear will die. I have always had an idea that Rinderpest is complicated with other diseases.

I am, Sir,
Your obedient servant,
Professor Varnell. W. SHIPLEY, M.R.C.V.S.

The following letter respecting the worth of medicine in the treatment of Cattle Plague is as valuable as the above.

My dear Sir, Newcastle, Dec. 11, 1865.

In answer to yours respecting the treatment of "Cattle Plague," I am sorry to say that up to the present time I have seen very little good done by medicine. In this town we have had about 350 fatal cases, so you will see we have had plenty for observation. Every owner has been allowed to adopt his own plan of treatment; many have been accustomed to treat their own cows, and they have done so in this disease. Others have employed veterinary surgeons, farriers, chemists, &c. &c., and every now and then we have been told that Mr. Somebody had found a certain cure; but, alas! when further tried it has been found of no avail.

The manager at ——— wrote to the newspapers stating that a large per-centage would recover if properly treated; he also told some gentlemen he could cure 99 *per cent.* I need not tell you it was all nonsense. I don't know what medicines he gave, but he used to blister them over the occiput. I have seen 12 treated with ½ a gill of yeast each, 4 times a day; 1 recovered. I have seen them bled in the neck and and in the tail, blistered, drenched with turpentine and oil, aconite injected behind the ear, homœopathy, hydropathy, and now at the Sanitarium a gentleman is treating them with the Turkish bath, and the result of my observations is that the more you doctor them the sooner they die. In my opinion nothing beats a good nurse; nearly all the recoveries have been from good nursing. I recommend at the first a mild aperient; the animal to be well clothed, no hay to be given, but to have oatmeal gruel and boiled linseed four times a day. The most important thing is to get the nurse to constantly attend to them until the last; never giving up the gruel, and attending to the general comfort of the animal. I have seen the very worst cases recover with this treatment.

I don't attach so much importance to the purging as many do. I think all I have seen recover have purged; those that are constipated die soonest.

I will write to you again in a few days, and tell you how we get on at the "Sanitarium," where we have the "Turkish bath" and homœopathy under trial.

Yours truly,
CLEMENT STEPHENSON,
Professor Varnell. M.R.C.V.S.

P.S.—I have made out the incubative stage to extend to 21 days. C. S.

Reliable information has been received from Peterborough which shows in a very marked degree how intensely the disease raged in that locality, and what little control medicine had over it.

It was reported that Mr. Bourdass, M.R.C.V.S., of Bridlington, Yorkshire, was successful in his treatment of Cattle Plague, and that as many as 75 *per cent.* of the cases he undertook survived. Hearing of this through a friend at Beverley, we wrote to Mr. Bourdass to inform us what actually was the result of his practice and what was his treatment. The following is his reply.

Dear Sir, Bridlington, Nov. 28, 1865.

Respecting the treatment of Cattle Plague, I beg to inform you that the first cases I treated were severe ones, and I was not successful. I therefore was induced to try the effect of arsenic in combination with an anodyne. I first thought of morphia, but thinking aconite would be quicker in its action, and also more powerful, I combined aconite with arsenic in solution, which I gave in full doses four times, and in some cases six times a day. I have been astonished

in some severe cases to see the benefit derived from the use of these agents. Nevertheless, a great many die, and I think we have at present no specific for the disease. I am giving arsenic as a preventive to four beasts, and will let you know the result.

I remain,
Yours obediently,
Professor Varnell. G. Bourdass, M.R.C.V.S.

The following letter is a reply to a request made by one of us to be informed of the success of the treatment of Cattle Plague pursued by Mr. King, (a farrier).

Dear Sir, Blake Hall, Essex.

In reply to your inquiries as to the present state of my cattle, I have had twenty-eight taken with the disease, and nine saved. I have tried various medicines ; aresenicum may have been of some use as preventative, but not as a cure. I think Mr. King's drinks have been beneficial. I have only one single yearling that has not been attacked.

I am yours faithfully,
Professor Varnell. Capel Cure.

Mr. King's drinks were remarkably heterogeneous, but they principally consisted of stimulants.

Experiments conducted in the College Infirmary.

Experiments upon Cattle.

The first case of Cattle Plague admitted into the college infirmary was on the 13th of July. The cow was brought from Mrs. Nichols', and she exhibited, what we know full well now to be, well-marked symptoms of the disease. No treatment was adopted, and she died on the 17th. When this cow was first brought to the college she was placed in an open loose box, and as an experiment, the first one we tried, a healthy cow was placed with her in the same box. This second cow took the disease, from which she also died.

September 23d. A black and white calf about four months old was placed in a box with a sheep, which the day before had been in contact with a cow affected with the Cattle Plague.

On the 8th October the calf showed symptoms of having the disease in a very serious form, and on the 10th it died. No treatment was tried in this case.

October 21st. A red and white calf about five months old was placed in a shed with four sheep which had taken the disease from inoculation. On the 27th the calf showed symptoms of having taken the disease. On the 31st it died.

October 20th. A black and white heifer about two years old was inoculated with the virus taken from the nostrils of a cow affected with the plague. No effect.

November 14th. Inoculated the same heifer with matter taken from the nostrils of a Dutch cow labouring under the disease in a very intense degree. No effect.

This heifer has resisted the effects of both inoculation and exposure to infection up to the present time, viz., December 25th.

October 20th. A black and white Dutch cow which had recovered from a mild attack of the disease was inoculated with matter taken from the nostrils of a cow affected with Cattle Plague. No effect.

December 6th. Inoculated a red calf about five months old with matter taken from the eye of a cow labouring under Cattle Plague. On the 11th, being the fifth day after inoculation, symptoms of the disease were manifest. Died on the 15th. This case was treated.

December 6th. Inoculated red calf about five months old with matter taken from the eye of a cow affected with the plague. On the 12th, *i.e.*, six days after the inoculation, it showed symptoms of the disease, and died on the 17th. This case was treated.

December 11th. Red and white calf about six months old was placed in an infected box in which a cow had died the day before. On the 18th it showed symptoms of the disease, and died on the 22d. This calf was under treatment.

Experiments with Sheep.

October 14th. One sheep (a hogget) was inoculated with matter taken from the eye of an ox affected with the plague. On the 20th it showed marked symptoms of the disease, and died on the 23d. No treatment.

October 14th. One sheep (a hogget) was inoculated with matter taken from the nostrils of one of Mr. Harvey's sheep from Crown Point, Norwich. On the 20th it showed well-marked signs of the disease, and died on the 23d. No treatment.

October 14th. One sheep (a hogget) was inoculated with matter taken from the nose of the same sheep as in No. 2, and on the 20th it evinced symptoms of the disease. It died on the 30th. This sheep was put under treatment.

October 14th. One sheep (a hogget) was inoculated with matter taken from the eye of an ox affected with the plague. This sheep was put under treatment, and recovered.

October 19th. Two sheep (hoggets) were placed in a shed with a cow affected with the plague. On the 23d both sheep became affected with the disease, and on the 31st they died. No treatment.

October 6th. Two sheep (hoggets) were placed in a shed in which a cow had died the day before from the plague. The disease did not declare itself in these two sheep until the 26th. One of them died on the 30th, and the other lingered on until the 19th of November.

November 14th. Inoculated one sheep (hogget) with matter taken from the vagina of a cow labouring under the disease. It died on the 15th, about 24 hours after being inoculated. It can hardly be imagined that this sheep died from the effects of the disease through inoculation ; yet it is remarkable that every part of the mucous tracts, both alimentary and respiratory, indicated faint blushes of redness precisely in those places in which they are almost invariably found in true cases of Cattle Plague. This sheep had been suffering from diarrhœa for some time previously, but had quite recovered, and at the time it was inoculated appeared to be very healthy.

Experiments on a Pig and a Donkey.

October 25th. A strong healthy pig was inoculated with matter taken from a cow labouring under Cattle Plague. No effects.

December 6th. Inoculated a donkey with matter taken from the nostrils of a cow affected with the disease. No effects.

It will be admitted, we believe, that the experiments are conclusive proofs of the contagiousness of Cattle Plague both by inoculation and by infection by exposure. They also clearly prove that the disease can be transmitted from the ox to the sheep, as well as from the sheep to the ox tribe, and they likewise show that an occasional animal will not take the disease either by inoculation or exposure, as instanced by the black and white heifer No. 3. These experiments further demonstrate (see the case of the black and white Dutch cow, No. 4) that animals which have had the disease even in a very mild form are incapable of contracting it a second time. Hereafter a case will be mentioned in which a cow having had the disease recovered, and after recovery resisted the influence of the affection for a sufficient length of time to almost satisfy us that she was not liable to a second attack. Having produced Cattle Plague in several instances both by inoculation and infection by exposure, we have had opportunities of noting the symptoms from the very earliest period of the disease declaring itself in any animal. In our preliminary remarks we stated that the intensity and regularity of the symptoms

vary in different cases, while those that are present in every instance are so thoroughly diagnostic of the disease that a careful observer could hardly mistake them for those of any other malady. The variations are greatest in the early stage of the affection, and there are several circumstances at this period of the attack which to some extent may influence the judgment and subsequent proceedings of the observer. We refer chiefly to the ordinary conditions under which animals are living, that is, whether they are kept in warm sheds and well fed, or whether they are placed in open fields exposed to variations of temperature, and perhaps supplied with bad food. Great consideration should be devoted to the natural habits and more particularly to the variations in temperaments of the bovine animal. Experience has proved that if such matters are not attended to, a wrong diagnosis will very often be formed, and the golden hour will be lost, both as regards the possibility of curing the animal and the opportunity of removing it from the herd to some suitable place for treatment before it can communicate the disease to the herd, or contaminate the building in which it and other animals may be kept.

Symptoms.

The earliest symptom that we have observed is an unusual stillness in the animal. Nothing else perhaps is noticed for several hours afterwards, when the coat becomes rough, and the eyes will have a peculiar stare, but as yet the animal does not refuse its food. Occasionally these symptoms pass off, and the observer imagines that nothing is the matter with the beast; but the symptoms merge into others of the following character:—the animal refuses its food, rumination ceases, its eyes look watery, the lids are a little reddened, the secretion of milk is arrested, and perhaps also in some measure that of urine, and there are also in some instances indications of constipation. The animal is frequently lying or obstinately standing in one position; slight rigors may have been present, but they will most likely have passed away. The breathing is a little quickened; the temperature of the body is apparently increased; the pulse is also quickened to about 60 or 65 per minute; and the visible mucous membranes of the external openings are slightly heightened in colour, particularly at the edge of the gums and under the tongue. We have ascertained such to be the symptoms in the commencement of Cattle Plague, and that they are developed in about from 12 to 18 hours. On many occasions we have noticed that an animal which was apparently well in the morning exhibited in the evening the symptoms above described.

Second Stage.

All who are familiar with cattle must have noticed, especially in the morning, and in frosty weather, the peculiar, and to most people pleasant, odour of the cow's breath. During the commencement of the second stage this will have disappeared, and in its stead a sickly unpleasant odour will be noticed. This peculiarity has invariably existed in all fatal cases, and is one which may enable the practitioner to foretell the death of the animal. It is suggestive of decomposition of the secretions, and of the necessity for using disinfectants. The cow is now frequently in a lying position, but if standing her feet will be drawn nearer together than is the case naturally, her back is arched, her ears are hanging downwards and backwards; she grinds her teeth; the under surface of the eyelids are considerably reddened; and there is much discharge from the inner canthi of the eyes, which has a tendency to encrust upon the lids. Within the nostrils the mucous membrane is heightened in colour, and from them runs a sero-mucous discharge. The lining membrane of the mouth, particularly that part of it which is under the tongue, around the openings of the ducts of the submaxillary salivary glands (sometimes called "the barbs"), is much redder than it was originally. There will likewise be a bluish red line near the margin of the gums, and the epithelium will probably have been partially shed, leaving reddish purple surfaces, having the appearance of excoriations. The thin common integument of the vulva will be slightly reddened, and if carefully examined small pimples will often be observed under the edges of the labiæ. Its mucous membrane will be redder then it is naturally, somewhat mottled in appearance, and there will be a considerable mucous discharge from the opening. Should the animal under examination be a male, its perinæum may have some of the small pimples upon it. The coat will look rough and unhealthy, and the skin will be dry and harsh to the touch. The breathing is quicker than in health, and the pulse may be about 70 per minute. In some cases diarrhœa may have commenced. The animal may not chew its cud, nor take any food, and in some cases great thirst is manifested. The ends of the horns are cold, as are also the feet, but the surface of the body is still warm. The actual temperature, as indicated by the thermometer, is increased to perhaps 102° F.; the urine is scanty, although the animal shows a frequent desire to void it.

Third Stage of the Disease.

On entering the shed at this advanced stage of the disease, the odour from the cow is sickening, especially if such beast is kept in a closed shed. The next thing that will very likely attract attention is a twitching of the muscles of the front of the thigh, the back of the shoulder, and in some instances nearly over the whole body. Diarrhœa will be profuse, except in a few instances. The evacuations are offensive, and sometimes streaked with blood, but occasionally of a light brown colour. The urine is highly coloured; the discharge from the vulvæ is of a muco-purulent character. The mucous membrane of the anus is reddened, and may be found slightly protruding. The eruption on the skin of the perinæum, neck, face, legs, udder, and teats may now be visible to a greater or less extent. The skin becomes cold over the loins, where emphysema may have taken place (but the latter is not in all cases). The body is covered with flies (if in the season when they exist); the legs are cold, as are also the ears and horns. The head protrudes; the ears are remarkably pendulous; the eyes are drawn back into their sockets, and a purulent discharge flows from their inner canthi. The lips and margin of the nostrils are swollen, and the discharge from the openings is copious, as is also the flow of saliva and mucous from the mouth. There is to be detected tenderness and swelling in the region of the throat, and the epithelium is found pealing off in patches from the inner surface of the mouth, leaving a dark purplish red surface. The respirations, which are accompanied by a peculiar moan, will be 30 to 50 per minute, and the pulse will probably be 80 or 100 per minute. The animal grinds its teeth, and is frequently in a recumbent position.

Fourth and last Stage of the Disease.

This stage, according to our experience, and taking the average of the cases we have had under observation, will happen about the fourth day. It is a most loathsome stage of the disease to witness, and were it not for the disinfectants used the stench would be almost unbearable if not dangerous. The animal is most often found lying with its head thrown backwards on that side of the trunk which is uppermost, or if the breathing be much laboured from emphysema of the lungs the head will be protruded, which will also be the case if she is standing. Its respirations, which are not so quick as they were, will be affected with a peculiar distressing moan and sometimes also with a grunt. The evacuations *per rectum* are copious, in many cases they are mixed with blood, and always in this stage offensive to the smell. The surface of its body is cold, and has a death-like feel.

The pulse is reduced below the natural standard, and the beats are feeble. The temperature of the body will have fallen in some instances as low as 90; in one instance it fell even lower. Emphysema, if it exists, will very likely be extended over a great part of the body. The eyes will be drawn deeply into their sockets, and the visible mucous membrane generally will have a dark livid hue. If the alvine discharges have been copious and much mixed with blood, the mucous membrane of the rectum will in many cases protrude, showing its highly congested condition. Death closes the scene, generally almost without a struggle.

Such is a description of the average character of the symptoms exhibited by the cases that have come under our notice, as collected from the rough notes made during the progress of our investigation. In a few cases, however, the symptoms have varied in several respects. We shall now give some examples of such variations, notwithstanding that they will be alluded to again when we describe our treatment.

Cases in which the Symptoms differed from those present in the majority of instances.

Example 1. August 31. Red and white cow, five years old, breed English. This cow was attacked with the plague two days previously to her being brought to the college. Her symptoms were of the usual average character. She was put under treatment, and seemingly progressed favourably up to the 10th of December. Rumination returned, as did also the appetite, as well as the secretion of milk, to a certain extent. On the 11th she still continued to feed, fæces natural, but she now showed symptoms of the foot-and-mouth disease. Vesicles appeared between the digits and around her coronets, but her mouth was unaffected. The pain she experienced was so excessive that she could scarcely stand, and on the 14th she was almost continuously in a recumbent position. At this period her fetlock joints became affected, and were much swollen and very painful. These conditions, together with the pain in the diseased feet, and her reduced strength, caused her to become exhausted, and she died on the 17th.

Example 2. September 3. A black and white calf, which had been exposed to infection by being placed with two sheep that had been in a shed with a plague-stricken cow, showed well-marked symptoms of the disease, and subsequent died on the 5th. The indications of the malady in this case were unusual. During the first twelve hours the most prominent symptom was extreme stupor, the animal lay down the greater part of the day, and if made to rise its movements seemed to be unconsciously effected. After the stupor, the eyes became unusually bright, and the conjunctival membrane intensely red; great cerebral excitement was also a characteristic of this stage. It bellowed, ran at a furious rate round the small yard which contained it, until it fell from exhaustion.

These symptoms lasted about twelve hours, after which the calf commenced purging freely; its breathing quickened; its pulse became very feeble; its visible mucous membranes acquired a dark livid hue; its legs were cold and clammy, and in about forty hours from the time it was first observed to be ill, it died. In this instance, had not the *post-mortem* appearances corresponded with those invariably observed in Cattle Plague, we should not have considered it a genuine case of the affection. We have no doubt but that the disease was communicated to the calf from the shed by the two sheep just alluded to, and that its effects upon the nervous system, together with the influence exerted by the heat of the atmosphere, which was particularly intense in the yard where the case was placed, brought on a train of symptoms dissimilar to those usually present in Cattle Plague. This case suggests to our mind the necessity for a due consideration of temperature.

During the latter part of November we saw several instances of cows having the plague in which the conjunctival membrane was not affected, nor was there any discharge from their eyes, and but little from the nostrils, neither were their mouths affected throughout the attack. All the other symptoms were identical in kind and quite as intense as those usually met with. The duration of the disease, from the time of its being recognized to the death of the animal, was the same as that noted in ordinary cases.

Constipation of the bowels, from the commencement of the attack to its termination, existed in three or four instances, but in these cases the disease was not less severe nor of shorter duration than we have observed it to be in the other cases which have come under our notice.

Subcutaneous emphysema, although a prominent symptom in this affection, is not present in all instances. Not more than one third of the cases that we have had under our observations have shown any indications of it. To determine the relation it bears to the eruption on the skin, further investigation is necessary.

We suggest, therefore, that further observations be made in this direction. Since our attention has been particularly directed to the eruption on the skin, we have thought that it is not one of the most unfavourable symptoms, and we have also known cows survive that have had rather extensive emphysema; but these cases have not occurred in our own practice.

Symptoms in Sheep.

Fundamentally they are the same as in the ox, and those who have seen them in the latter animal affected with the plague would have no difficulty in recognizing the identity of the disease in both classes of animal.

First stage. Usually the earliest symptom is, that the animals have lost their natural and peculiar liveliness. On approaching them we see that they hang their heads down, they look dull, and they seem to have a great desire to get by themselves, and are frequently lying. In addition to the foregoing symptom, there is partial loss of appetite, languid rumination, and frequent grinding of their teeth. If made to move, the creatures do so with their back a little arched, and there is a great disposition to slacken their pace, and perhaps to lie down.

Second stage. In this stage the animal will occasionally eat a little food, but it rarely ruminates. The experienced flock master or shepherd will see at a glance when his sheep are not well. The coat will have lost its gloss; for however long or rough the wool on a sheep may be, it is glossy in health. The animals will cough if disturbed. There will be a slight discharge from their eyes and nostrils. Their ears will be lopped, their eyes partially closed, the eye-lids swollen, and their lining membranes, especially of the lower one, reddened. (This we have observed to be more common in sheep than in oxen.) Respiration and the rapidity of the pulse is increased, and in the majority of instances diarrhœa will have set in.

Third stage. When an animal is affected with the plague in this stage it manifests a great desire to be alone, and to put its head into a corner. Its breathing is accelerated; the pulse is quick; the feet are cold. The alvine evacuations are profuse and fœtid; there is a muco-purulent discharge from the eyes and nostrils; the appetite is gone; great thirst is evinced, and the animal if it gets the opportunity will sometimes drink large quantities of water. The animal grinds its teeth as if in pain, and will allow any one to approach it.

Fourth and last stage. This occurs shortly before the death of the animal, when if in a field it will be found near to or partially in some hedge or secluded nook. If the animal is in a shed or stable it will get under the manger or into some corner, and frequently stands with its head pendulous; but more often the animal is lying down. The breathing is accompanied by a low moan, and sometimes, as in the ox, by a grunt. Their evacuations are fœtid; the visible mucous membranes have a livid hue; the gums are partly denuded of their epithelium; the wool is detached

with ease; the breath as well as the whole carcase is offensive to the smell. Soon after these symptoms make their appearance death takes place.

The Cattle Plague is communicable to Goats.

We have heard of several instances of goats having died from the effects of Cattle Plague. One case occurred in the college infirmary. The animal which was the subject of the complaint showed all the symptoms of the disease in a very striking and positive manner. The *post-mortem* appearances also were in every respect characteristic of Cattle Plague. A goat is now in the infirmary exhibiting well marked symptoms. On December 28th we examined a goat affected with the plague which it caught from cattle labouring under that affection.

Period of incubation in the Ox.

We think it necessary to speak with some caution on this subject, not only in a pathological point of view, but also because we can understand that legal proceedings might require definite answers respecting the time the morbid material entered the system and its manifesting itself by well-known symptoms. Under some circumstances it would be very difficult indeed to determine when the poison enters the system so as to name with any degree of precision the period at which the incubation actually commenced. This must necessarily happen in all instances except in those of direct inoculation. A period can be tolerably well fixed in instances where healthy animals are placed immediately in close contact with those actually affected with the disease, or if they are placed in a shed or closed box from which a diseased animal has just been removed. A less definite period can be ascertained in instances where healthy animals are accidentally or intentionally mixed with diseased ones, especially if there should be a large range of pasture over which the herd may spread itself. But the period of incubation would be far more difficult to determine in those instances in which to many the disease appeared to arise spontaneously; for example, where it breaks out in districts quite isolated from animals having the disease, or where no known causes exist for its production. By direct inoculation the period of incubation has been ascertained to be from six to eight days before the symptoms were fully declared. By exposure to infection the period, as far as we have been able to determine, has varied from five to nine days. Some have thought the period of incubation may be as long as sixteen days, and we have heard of one instance in which it was thought to have extended even to twenty-one days. Our own experience, however, does not enable us to speak confidently with respect to a longer period than nine days.

The Incubative Period in Sheep.

This we have found to be more variable than in the ox. The plague has been produced in sheep by direct inoculation in five days. From the result of our experiments on inoculation we are disposed to place the period of incubation in the sheep at from five to eight days, and by exposure in a confined shed at from five to twenty days. The disease is produced in sheep by inoculation with as much certainty as it is in the ox, and the same obtains nearly to the same degree if sheep be placed with diseased animals in closed sheds; but if they are kept in open fields, especially if the range is large, many may for a long time escape, and some altogether.

Convalescence in either Cattle or Sheep.

In those cases that recover it is difficult to determine how soon perfect health will be restored, as we have no direct evidence to assist us in forming an opinion on this point. Cattle that have been the subjects of plague are a long time before they again thrive well; their skins remain harsh and dry; there is a large amount of scurf in many places; there are scabs, and the cattle do not feed as in health. If the convalescents be milking cows their skins have the characters just enumerated, and their milk, although it may have partially returned soon after the commencement of recovery, many weeks will elapse before the normal or full quantity is secreted. The restoration to health in sheep takes place much more slowly than in cattle. We have seen many sheep linger from week to week; a circumstance which makes it exceedingly difficult to predict whether recovery or death will be the animal's fate.

Professors Varnell and Pritchard.

Report to Commissioners

The treatment of Cattle Plague.

We regret to report that we had not progressed very far with the experiments upon treatment before we came to the conclusion that comparatively little benefit would be derived from the use of drugs. As, however, many persons held a contrary opinion, and as we ourselves had no positive proof of their inefficiency, we determined to test the effects of the therapeutic agents hereafter mentioned.

Our treatment commenced at a season of the year when the temperature was unusually high, viz., in July and August, which we thought militated more or less against recovery. After a time, however, the weather became colder, but still no better results were obtained, as will be seen by a perusal of the following description of cases. We have not given a detailed account of the treatment of any one case, but have briefly indicated the principal agents used, and described the results observed in each experiment.

Cases that have recovered.

No. 1.

A large Italian cow in very good condition was admitted into the infirmary, affected with the Cattle Plague. The symptoms were not intense, but they were well marked. The treatment consisted of saline laxative and diuretic medicines, and as soon as the fever subsided she had some diffusable stimulants. Light succulent food was allowed her, and her body was well clothed.

No. 2. A Dutch cow.

A very mild case; still the symptoms were sufficiently defined to enable the inspector, who sent her to the college, to assert that she was affected with the plague. The secretion of milk was suspended, she refused her food, the lining membrane of the vulva was heightened in colour, and she had diarrhœa; some saline medicine, and afterwards brandy, was given to her in some gruel. On the third day after her admission the cow gave evidence of returning health, but in about a week or ten days from this time the joints of her hind limbs, and particularly one limb, became inflamed. The treatment consisted in the exhibition of mild laxatives, and the application of fomentations to the inflamed joints. A week after being thus treated she was so far recovered that she was returned to her owner.

No. 3. A Dutch cow.

This case was sent to the college by an inspector as a case of Cattle Plague. The symptoms were very slight; saline laxative medicine, succulent food, and the usual good nursing was all the treatment she received. In a week from the time of her being admitted she was convalescent. This cow came into the infirmary in September, and still remains there. She has been exposed to the influence of infection from all the cows that have since been in the college; she has also been twice inoculated with the matter taken from cows affected with the plague in its most virulent form. So completely has she resisted both infection and inoculation that she remained well during the period she has been under our observation. She is still in good health, and gives a fair amount of milk.

No. 4. A Dutch cow.

This case was considered by the inspector to be a very mild one. On its arrival at the infirmary we noticed that the animal had diarrhœa. The colour of the mucous membrane was heightened; the secretion of milk was arrested; but she did not wholly refuse her food. Some medicine forwarded to the college from the continent was given her. We are not aware of what it consisted, or whether it exerted any power

Professors Varnell and Pritchard.

Report to Commissioners.

No. 5.

in arresting the progress of the disease. At any rate the cow recovered, as we in fact anticipated would be the case from the first.

HYDROPATHY.

About the middle of September two cows affected with the Cattle Plague were treated on the following plan:

After the body had been well douched with cold water it was immediately wrapped in wet sheets, over which dry clothing was placed, and the whole closely bound to the skin of the cow by bandages. Even before this operation was completed she became partially unconscious, and lay down, in which position she remained for half an hour. In a short time afterwards her skin became quite warm. The cow then stood up for about an hour, and it was found that considerable perspiration was produced. The wrappers were now removed, her body was well rubbed, and completely covered with dry rugs. Some gruel was given her, and in about half an hour the following draught was administered. Tincture of opium one ounce, tincture of camphor one ounce, water one pint.

On the following day she was much worse; the douche and wet sheets were again used, with apparently nearly the same effects as those above described. Medicine same as before. From this period the cow rapidly became worse, and she died on the third day after her admission.

The results of treatment in this case were similar to those in No. 5. Nos. 5 and 6 were the only two cases treated on the hydropathic principle. We are inclined to think that a modified form of this treatment might be beneficial.

Cases that have proved fatal.

No. of Case.	Date.	Description of Animal.	Age.	Therapeutic Treatment.	Remarks.
1	1865. Aug. 31	Cow	5 years	Brandy and opium in full doses; occasionally saline laxatives as eliminatives; a mixture of oil and turpentine was used as a counter-irritant to the under surface of the abdomen.	This cow lived 17 days after she was admitted. On the 11th day we thought she was recovering. On the day following she was attacked with the foot-and-mouth disease, which caused so much irritation that she gradually became worse, and died on the 17th of September. This cow had chronic disease of the lungs.
2	Aug. 28	Cow, Dutch	5 years	Stimulants, such as brandy and carbonate of ammonia, three times a day; good supply of nourishing food; skin well cleansed.	The symptoms in this were not very intense when the cow was first admitted; but they rapidly became worse, and she died on the 1st of September.
3	Sept. 7	Cow, Dutch	6 years	This cow was treated chiefly with strong ale, which was given her in gruel four times in the day.	The cow was slaughtered on the 9th for *post-mortem* examination, so that the effects of treatment are imperfectly known. Up to the time, however, of the animal being killed, it appeared to derive no benefit from treatment.
4	Sept. 27	Cow, English	4 years	Solution of acetate of ammonia and chloric ether twice a day; gruel four times a day; the skin well cleansed.	This cow did not show any severe symptoms until 29th; indeed we anticipated some benefit from treatment; but on the evening of the same day she became worse, and died on the 2d of October.
5	Oct. 1	Cow, English	4 years	Linseed oil and oil of turpentine in gruel every twelve hours; good oatmeal gruel four times a day.	This plan of treatment was recommended, but it proved of no avail. The cow rapidly became worse, and died on the 4th of October.
6	Oct. 4	Cow, Dutch	5 years	Diffusible stimulants and sedatives every eight hours; the greatest attention paid to the animals comforts; half pound doses of charcoal in gruel twice daily on the fourth day.	This cow lived eight days; on the third day her symptoms were favourable; but on the fourth, diarrhœa, attended with much fœtor, commenced, and emphysema appeared on the loins. From this time she rapidly became worse and died on the 12th of October.
7	Oct. 21	Cow	7 years	Well clothed the body after having first cleansed the skin; free supply of the oatmeal gruel, and sulphate of copper and brandy every eight hours.	This cow rapidly became worse from the day it was admitted; the loins of the animal were emphysematous; she had profuse diarrhœa, and died on the 24th of October.
8	Oct. 22	Cow, English	5 years	Hay or bran tea as much as the patient would take; brandy and sulphate of copper every eight hours; gruel every four hours.	In addition to this animal being dosed with medicine, she was made to inhale the vapour of warm water twice a day, and the vapour of vinegar twice a day. This treatment had no appreciable beneficial effect. The patient died on the 25th of October.
9	Oct. 22	Cow, Short-horn	4 years	Diffusible stimulants and saline laxatives; opium was given to check the diarrhœa when it was present.	This cow had the usual good nursing, but she died on the 25th of October.

No. of Case.	Date.	Description of Animal.	Age.	Therapeutic Treatment.	Remarks.
10	Oct. 22	Cow, Short-horn	4 years	Chlorate of potash three times a day; opium occasionally to check diarrhœa.	The disease in this case ran its course so rapidly that the animal died on the 24th, i.e. two days after being admitted.
11	Oct. 23	Cow, English	6 years	This case was placed in a vapour bath for one hour, after which she had solution of acetate of ammonia, carbonate of ammonia, and spirits of nitric ether; when the cow had been in a bath an hour, rubbed dry and well clothed; diffusible stimulants were given; no good effects were observed to follow this treatment. On the 24th stimulants and vapour bath, as before, also gruel, and attendance to general comforts.	No benefit whatever seemed to attend the treatment, indeed we thought it rather tended to hurry the disease to its fatal termination. The animal died on the 26th of October.
12	Oct. 23	Cow, English	5 years	Skin well cleansed; body well clothed; thin gruel; hay or bran tea; chlorate of potash twice a day.	The course of this disease was rapid; profuse diarrhœa from the first, accompanied by very offensive evacuations streaked with blood. The patient died on the 25th of October.
13	Oct. 23	Cow, English	4 years	Skin well cleaned; body well clothed; gruel four times a day; chlorate of potash; opium to check diarrhœa.	This cow succumbed to the disease very quickly, viz. on the following day (October 24th).
14	Oct. 28	Short-horn cow	5 years	Cleansed the skin, clothed the body, and gave brandy with opium in full doses twice during the day; chlorate of potash in drinking water next day (29th); gave nitro-hydrochloric acid, tincture of cinchona in water three times in the day; hay tea to drink.	On the 30th the diarrhœa ceased to be so profuse, and the evacuations so offensive as they were at first, but in other respects the patient was evidently worse. She died on the 31st of October.
15	Oct. 28	Short-horn cow	6 years	Solution of acetate of ammonia, carbonate of ammonia, and spirits of nitric ether in full doses; opium to check diarrhœa.	This cow died on the 1st of November.
16	Oct. 28	Bull, English	2½ years	Good nursing; the early treatment consisted in giving saline laxatives combined with diaphoretics, repeated every four hours, keeping the body well clothed, and frequently giving thin gruel; hot vapour bath for nearly two hours, after which he had a diffusive stimulant, and his body well rubbed and thickly clothed.	There was profuse diarrhœa. This bull died on the 31st. The treatment produced no change in the symptoms. The disease ran its course rapidly.
17	Nov. 3	English cow	6 years	Saline laxatives with diaphoretic agents every eight hours; clothed the body, and administered linseed gruel; injected opium with starch gruel per rectum. This treatment was continued.	The symptoms when the patient was first admitted indicated a mild attack; but the cow rapidly became worse, and died on the 6th of November.
18	Nov. 3	English cow	6 years	Treated in same manner as the last.	The cow died on the 6th of November.
19	Nov. 3	Brittany cow	4 years	Diffusible stimulants three times a day; opium three times a day, to check diarrhœa; body well clothed.	The symptoms in this little cow were very intense from the first. She died on the 6th of November.
20	Nov. 3	Calf	4 months	Bicarbonate of potash, tincture of cinchona, and tincture of gentian three times a day; thin gruel three times a day; hay tea to drink. The box in which this calf was placed was fumigated with burnt tar.	This calf contracted the disease in consequence of its being placed in a box in which a cow had died the day before. Symptoms of the disease were observed on the fourth day, and the animal died on the seventh day. The affection ran its course without being checked in the slightest degree. It may be mentioned that for one month the calf was within 40 yards of infected animals, and the man who attended to the cattle affected with plague was daily in the box with the calf. It was not, however, until it was placed in a decidedly infected shed that it took the disease.

No. of Case.	Date.	Description of Animal.	Age.	Therapeutic Treatment.	Remarks.
	1865.				
21	Nov. 3 -	Calf - - -	6 months	Treated in nearly the same manner as the last case; opium in enemas to check diarrhœa; tincture of gentian mixed with ale and gruel during the latter stages of illness to support the animal's system.	This calf lived until the 11th, a longer period than usual. Still, during its illness, no hopes of recovery were at any time entertained.
22	Nov. 3 -	Heifer - -	8 months	Same treatment as in the last cases.	Died on the 8th December. The progress of the disease in this case was not remarkably rapid, but it advanced steadily in spite of our treatment.
23	Nov. 4 -	Calf - -	4 months	Good nursing; chlorate of potash twice a day.	These calves exhibited all the usual symptoms, and although they were well nursed, they died on the 7th.
24	Nov. 4 -	Calf - -	4 months	Same treatment.	
25	Nov. 13 -	Cow, Dutch -	6 years -	Saline laxatives; chlorate of potash in drinking water.	No diarrhœa; but the fever was intense at the onset. She lived much longer than we expected, for although the progress of the disease was comparatively slow, there were no favourable symptoms noticed from the first. The animal died on the 21st.
26	Nov. 13 -	English cow -	4 years -	These four cows were all treated in the same way as far as medicine is concerned; nitre, hydrochloric acid, and infusion of cascarilla bark three times a day; aromatic spirits of ammonia once a day; ale or stout twice a day; every attention paid to clothing and general comforts.	One of these cows died on the 15th, one on the 16th, one on the 18th, and the other on the 21st. These cases were treated precisely on the same plan as that which is said to have been so successful with the veterinary surgeon near Windsor. With us, however, it has been a complete failure.
27	Nov. 13 -	English cow -	6 years.		
28	Nov. 13 -	English cow -	5 years.		
29	Nov. 13 -	English cow -	4 years.		
30	Nov. 14 -	Cow, English -	3 years -	Two ounces sulphate of soda followed by one-ounce doses every eight hours; injection of opium in thin starch when the purging became profuse.	One of these cows died on the 15th, one on the 16th, and one on the 17th. The medicine in these cases seemed to have no control over the disease, which ran its course in all these animals with great rapidity.
31	Nov. 14 -	Cow, English -	5 years.		
32	Nov. 14 -	Cow, English -	6 years.		
33	Dec. 11 -	Calf - -	4 months	These two calves were both treated with sulphite of soda, and good nursing was enforced.	These calves took the disease by inoculation. These patients when first attacked were constipated, but on the second day their bowels became relaxed, from, we believe, the effects of the medicine. No fœtor attended the purging. One of these calves died on the 15th, and the other on the 17th.
34	Dec. 12 -	Calf - -	4 months.		
35	Dec. 18 -	Calf - -	5 months	This calf was also treated with sulphite of soda.	This calf contracted the disease by being placed in an infected box. It rapidly became worse, and died on the 22d. Before death the purging was profuse, but not fœtid.

Fifty-three head of cattle were admitted into the college infirmary, forty-two of which were put under treatment, while the remaining eleven received no medical attention whatever. Seven of the eleven cases were so far advanced that they either died the day on which they were admitted or on the following day. The other four were cases of average description, and were therefore purposely left to nature. They were nevertheless nursed with the same care as those that were actually under medical treatment. In these instances nature likewise failed to effect a cure.

The Value of Drugs as Remedial Agents.

It will be seen by the foregoing statements that we attach but little importance to the use of drugs, in consequence of their producing very little, if any, beneficial effect upon plague-stricken animals, nevertheless we think that when the history and pathology of the disease are better understood a much larger per-centage of animals affected with it will be saved; that drugs will take some share in performing the cures; and that, therefore, medicinal treatment must not be wholly neglected.

Prophylactic Treatment.

Firstly. As far as we can at presen understand the nature of Cattle Plague we are inclined to think that immnnity from it might be obtained either by artificially producing, if possible, a mild form of eruption, or by introducing into the system the virus of vaccine lymph so that a constitutional change might be wrought. Two weeks ago we commenced a trial of this plan by vaccinating sound young cattle. At present we cannot speak as to what the result of the experiments will be, but we look forward to vaccination as the principal preventative against the disease.

Secondly. We most strongly advocate the keeping as far apart as possible from healthy stock all animals labouring under the plague, or such as may have been in contact with or even near animals having the disease, whether they be in sheds or fields, or such as have been in sheds or fields where affected animals were previously kept, until one month has elapsed after the removal of the diseased stock.

With reference to how near healthy animals may safely approach those that have the plague, we cannot

speak with that degree of certainty we could wish. We have made a few experiments on this point, but hesitate to publish them until they are verified by other and more extensive observations. It appears to us, however, that the distance between healthy and diseased animals should be as great as possible.

We are of opinion that it should be made a misdemeanor, if not a criminal offence, for any one knowingly to drive or place, or cause to be driven or placed, animals that are affected with the plague within at least one hundred yards of healthy ones, or even into uninfected cow sheds or stables other than their own, until by a number of well-attested experiments it is fully ascertained within what distance a diseased animal can be approached with safety.

Thirdly. Endeavour to keep stock as healthy as possible, and not to produce an excited state of their systems by the use of too much highly stimulating food. On the other hand, avoid engendering debility by an insufficiency of food which is innutritious, or such as has been badly preserved.

Fourthly. Animals should not be crowded together under any circumstances, and they should not be subjected to excitement by bad usage, as we think it tends to predispose the system to disease.

Fifthly. Avoid extremes of heat and cold as much as possible. In wet weather and when the temperature is low, animals should be protected. When the weather is unusually warm they should remain as quiet as possible, and care should be taken that they have a plentiful supply of pure water. A high temperature, and driving animals very quickly in large quantities, especially if the supply of wholesome water be limited, are injurious to health.

Sixthly. — Lofty and well-ventilated cow or bullock sheds are indispensable to the health of the animals they may contain. Overcrowded, badly ventilated, low-roofed cowsheds are very objectionable. It is impossible to say what share, if any, such sheds the slates or tiles of which are within two feet of the cows backs take in the production of disease during very hot weather, or in determining the precise nature of the disease when so produced.

Seventhly.—To prevent animals becoming diseased when housed, extreme cleanliness should be insisted upon. The excreta should be frequently removed; and not less than once every day, the floor should be thoroughly cleaned, as should also the manger.

Eighthly.—It is highly important that the skins of animals that are housed should be as well groomed as the thoroughbred horse is. If such precaution be not taken it is easy to imagine how, in that which should have been eliminated from the system by the skin, a poison may be generated which may find its way into the blood, and produce ill effects.

Ninthly.—An occasional change of food is important to the preservation of the health of stall-fed beasts. If animals under such circumstances are at any time found to be unusually dull from their digestive organs being overloaded, the amount of food supplied to them should be lessened, and that which is given to them should be of a succulent nature. Should the dullness first alluded to be observed, a dose of catharctic medicine, consisting, for example, of sulphate of magnesia, sulphur, and powdered ginger ought to be given to them.

Tenthly.—Buildings should be so arranged that a steady current of pure air is constantly circulating through them. Stagnant air, especially when surcharged with the emanations from animals, must be injurious to health. Such are the principal and most important prophylactic means that should be, as it strikes us at present, resorted to.

Curative treatment.

In the preservation of the health of animals a good supply of fresh air is indispensable, so is it also important in curing them when diseased. Air is one of the best disinfectants; therefore a well-ventilated shed in which the temperature ought not to be higher than 65° F. or lower than 55° F. Next secure a good nurse and plenty of clothing whereby the attendant can regulate the quantity the animal may require at different stages of the disease. Provide means for supplying the animals with bran mashes, with either oatmeal or linseed gruel, bran tea and hay tea. Animals in the earlier stages of the disease, with such appliances and with good nursing, may possibly have a better chance of recovering than they would if crammed with drugs; nevertheless, we feel that we should not be doing our duty if we did not attempt to assist nature to the best of our ability. Under almost all circumstances, in these stages of the disease, we believe that some saline laxative may be given with advantage, and that the action of the kidneys should not be allowed to cease, if by the use of nitrate of potash it can be kept. We think that benefit may be derived from the use of small and repeated doses of sulphite of soda, and from the administration of chlorate of potash. The food should be as easy of digestion as possible; the surface of the body should he kept of an equal temperature by clothing, which must be regulated accordingly. We are no advocates for much rubbing the skin when the disease has fully declared itself, as the rash which sometimes appears early makes the organ very tender. In the latter stages of the disease the system may need support, to prevent a relapse or to restore its health. For this purpose malt, scalded bran, gruel, with ale or stout two or three times a day, may be employed. In some instances mineral acids, combined with infusion of bark, may also be given alternately with ale. If we go any further in recommending medicine we feel that we should be quite as likely to advise that which may do harm as that which may do good. We must strongly deprecate the use of heating medicine in this affection.

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Treatment of Sheep.

This will be the same in principle as that recommended for cattle. If the disease takes place in the heat of summer shaded places should be selected for the animals, and they should have a supply of nitrate of potash water, or water in which chlorate of potash has been dissolved. Sheep should be furnished with food which is very easy of digestion, and they should be kept from that which is solid, such as hay, or "benty" grass. If it is in the wet cold season of the year, that those attacked should be sharply sought for at once, removed from the flock, and placed in some well-sheltered yard with open sheds. The same care and attention must be paid to sheep as that we have recommended for cattle.

Period which elapses between Declaration of Symptoms in and Death of Cattle.

The shortest period which has come under our own observations is four days. We have heard of its taking place in two days, in one instance in one day, and we have known cattle to live as long as nineteen days after the first declaration of symptoms of plague, i.e., seventeen days after the animal was put under treatment. This case is alluded to as No. 1.

Period which elapses between Declaration of Symptoms in and Death of Sheep.

We have known sheep to die in three days, and in one case we believe in one day, after the symptoms of the disease were fully manifested. In another instance a sheep lived thirty-five days after it was first attacked with the plague.

With the view of endeavouring to obtain as complete a knowledge as possible of the pathology of the disease, and to thereby be in a position to attempt a more rational mode of treatment, we engaged the services of Professor Tuson, the Lecturer on Chemistry in the Royal Veterinary College, to institute some observations on the temperature of animals, and on the characters of their urine. This was the only source from which we could readily obtain the infor-

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mation required; and although it, in consequence of the peculiarity of the disease, did not aid us in carrying out the medicinal treatment, nevertheless, through Mr. Tuson's assistance, we have been made acquainted with some important symptoms of the disease. We refer to the temperature of the body, and the condition of the urine, so far as its specific gravity and its containing or not albumen was concerned. The results of such observations informed us of the presence or absence of albumen, and, by deduction, of the increase or diminution in the amount of solid constituents of the urine. Professor Tuson afforded us information of this description throughout the greater part of the time we have been engaged in this inquiry, but as we believed the chemistry of this fluid would be freely entered into in another section of these investigations, we have not thought it necessary to embody in this Report all the information Mr. Tuson afforded us. We have, however, requested him to furnish us with a few examples of the results of his observations and experiments, and we now beg to direct attention to the following table, containing an account of them.

Tabulated Statement of some Results of the Physical and Chemical Examination of the Urine.

Date.	Description of Animal.	Temperature per Vagina.	Specific Gravity.	Albumen.	Remarks.
1865.					
Nov. 22	Large red calf - -	—	1040	Absent.	
Dec. 14	Ditto - -	102° F.	1029	Present.	
Nov. 18	Small red calf - -	—	1040	Absent.	
Dec. 8	Ditto - -	—	1041	Absent.	It will be noticed in the column headed Specific Gravity that the observations were apparently not continuous; the breaks, however, are occasioned by the inability to obtain urine on the dates appended to them.
„ 14	Ditto - -	101° ¼ F.	1026	Present.	
„ 16	Ditto - -	100° ¾ F.	—	—	
„ 12	Large red and white calf	100° ¼ F.	1040	Absent.	
„ 14	Ditto - -	100° ½ F.	—	—	
„ 15	Ditto - -	100° ½ F.	1038	Absent.	
„ 16	Ditto - -	100° ¼ F.	—	—	
„ 17	Ditto - -	101° F.	—	—	
„ 18	Ditto - -	102° ¾ F.	1029	Present.	
„ 19	Ditto - -	102° F.	1025	Present.	
„ 20	Ditto - -	101° F.	1017	Present.	
„ 21	Ditto - -	102 F.	—	—	

We think it desirable to mention that the temperatures of the animals were taken by means of a maximum thermometer, which, although protected from injury by being enclosed in a German-silver case, was so constructed as to permit of direct contact being established between the glass of the bulb and the organ into which it was introduced.

In conclusion we beg to state that notwithstanding our investigation on the symptoms, treatment, &c. of Cattle Plague has extended over several months, we conceive it to be exceedingly desirable, if not absolutely necessary, that the inquiry should be continued, in order that opportunities may be afforded for experimenting in directions other than those indicated in this Report. The vaccination of animals must be prosecuted with energy, not only by ourselves in London, but likewise by other persons in various parts of the country, so that information of a comparative character may be obtained.

George Varnell.
William Pritchard.

Professor Varnell. — Report to Commissioners.

Supplementary Report on the Trial of Vaccination as a Preventive for Cattle Plague, by Professor Varnell.

In the concluding remarks of the Report I had, in conjunction with Mr Pritchard, the honour to lay before the Royal Commission on the Symptoms and Treatment of Cattle Plague, we suggested the advisability of vaccinating with the view of testing its prophylactic power in this disease. We were by no means sanguine that the results of such a procedure would be such as the Commission, or ourselves, earnestly desired; nevertheless, that vaccination should be tried, was sanctioned by the expressed opinion of several eminent men in the medical as well as the veterinary profession.

The reasons for proposing vaccination, no doubt, grew out of the great similarity the eruption on the skin of animals affected with the plague bore to that of smallpox in the human subject. The two eruptions are not actually identical, and there are, without doubt, striking pathological differences in the two affections.

From the very beginning of the outbreak of the disease to the present time, I have no recollection of any one engaged in the investigation of the nature of Cattle Plague, either directly or indirectly, asserting that the disease now affecting cattle, and termed "Rinderpest," was smallpox. I can conceive that when it was first received as an exanthematous disease, that it was compared to that variety it most resembled, and this opinion, so expressed, was in the minds of the public equivalent to a positive statement that the disease was smallpox of a very malignant type.

This notion became the prevailing one, and there were those who seemingly struggled for priority in the discovery.

Vaccination was very naturally suggested as a means of mitigating the severity of an attack of plague, or, what is more desirable, in rendering a beast wholly exempt from it. For this purpose it was clutched at with the same eagerness that a drowning man would seize a straw to save himself from sinking. Neither can we be surprised that such should be the case seeing the immense havoc the disease was, and is still, making in our herds. To vaccinate cattle, lymph became so much in demand that a supply could not possibly be obtained. Letters came to the Royal

Veterinary College from all parts of the country, with a request that it might be forwarded immediately. This pressure continued until experiments upon vaccination as a prophylactic proved that it was of no avail, inasmuch as it neither mitigated the severity of the disease nor exempted an animal from its attack.

This disease, however, is now believed to be essentially dissimilar to smallpox, and vaccination to be intirely useless. This was contended for by some few individuals at the time the smallpox theory was first promulgated. Numbers of my own profession strongly protested against this theory. Professors Simonds and Gamgee always said that the disease was not smallpox, and that vaccination would be a futile procedure, and I feel bound to record the correctness of their views in this report.

Vaccination has been extensively resorted to throughout the country, and with so much anxiety for the welfare of the public, that many ill-natured conclusions have no doubt been published; some of these we fear may have been altogether erroneous, and productive of harm. The eagerness with which vaccination has been resorted to induces me to think that other means of security may have thereby been neglected, such, for example, as *positive isolation* associated with sanatory and hygienic measures.

There is reason to fear that vaccination would have been resorted to with lymph unfit for the purpose, or perhaps with a spurious article. But supposing the lymph used in every instance to be quite pure, I nevertheless can conceive that there are circumstances when it would be injudicious to vaccinate. There may be conditions of the system of an animal, in which such an operation would endanger its life. There are those who doubt whether the milk of a cow so treated is fit for children to drink. See the following letter:—

"17, Queen Anne Street, W.

"Dear Mr. Varnell,

"I cannot express how much I regretted to hear from you this morning that the two cases I vaccinated, and which you so kindly took charge of, are suffering from 'Rinderpest.'

"Pardon me if I suggest that, as your experiments now fully demonstrate that vaccination offers no means of prevention to the Cattle Plague, the public should at once be authoritatively informed of the facts by some statements emanating from the Royal Veterinary College. At present vaccination is depended on as the only means of warding off the complaint, and your experiments prove the hopes it offered are delusions. Another reason why the public should be cautioned, is the fact that my experiments demonstrate that vaccination is not unattended with danger.

"The first Alderney heifer I successfully vaccinated is suffering from a constitutional disturbance of the severest form. There is a large impetiginous patch on the inside of the thigh and similar discharging sores on the ears. If such accidents from vaccination happen to cattle well looked after, we may expect to find still more serious ones occuring on farms where surgical supervision is unknown and the lymph used impure.

"My own experience tells me that, even had vaccination proved a good preventive against the Cattle Plague, we ought to have hesitated before vaccinating milch cows, for I should not have allowed my children to have drunk milk drawn from animals that suffered from constitutional disturbance after vaccination, even if Professor Tuson was able, by his chemical tests, to satisfy himself the milk was wholesome.

"Pardon this hasty letter. I was on the point of leaving town, but I could not do so without sending you this short note.

"Believe me,
"Dear Mr. Varnell,
"Yours truly,
"W. Acton."

How far the fears entertained in the above letter, or the remarks I have made on the subject of vaccination, are correct, I am not now prepared to state. I think, however, they are questions worthy the consideration of the Commission, and of their suggesting stringent regulations as to who should be allowed to vaccinate cattle, and the sources from which the lymph is procured.

Experiments on vaccinating Cattle with a view to test its efficacy as a prophylactic in Cattle Plague.

Being desirous that the experiments should be efficiently carried out, I invited the co-operation of Professor Simonds, believing, and I trust correctly so, that the conclusions we should arrive at would be of greater value in the estimation of the public than if simply conducted by myself. I may further add that Professor Simonds was desirous of assisting me in consequence of its being his special province in the Veterinary College to investigate and lecture upon the diseases of cattle.

For the purpose of ascertaining the value of vaccination in Cattle Plague, an opportunity we did not expect offered itself, through which we were enabled to obtain two successfully vaccinated cattle.

W. Acton, Esq., M.R.C.S., with his usual desire to facilitate inquiries into the nature of the diseases of the lower animals, immediately on the subject of vaccination being mooted, at once consented to vaccinate all the bovine animals on his farm. For this purpose we procured a sufficient number of freshly charged points from the National Vaccine Institution which we placed in this gentleman's hands, and with which, on the 7th of January, he vaccinated seventeen animals of various ages. Of this number seven only took, some of them however were more effectually vaccinated then the rest. Two of these seven were selected by Mr. Acton and sent to the College as experiments. One of these animals was an Alderney cow giving a fair amount of milk. She had three well-marked vesicles on the vulva, two on one side and one on the other. The other animal was a half-bred Alderney heifer. She had but one vesicle on the vulva; still she was considered to be effectually vaccinated. On her arrival at the College a partial crust had formed over the seat of the puncture.

No animals could have been more suitable for the experiments we required them for than were these two. They came from a farm quite free from the Cattle Plague, and were vaccinated by Mr. Acton himself, who had never been exposed to the influence of the disease, therefore we may consider that both these animals were free from any taint whatever and were thereby good tests.

No. 1.—January 20th. An Alderney cow which had recovered from sucessful vaccination was placed for twenty hours in a loose box with a "bud" affected with Cattle Plague. On the 26th the cow showed symptoms of the plague, but in a milder form than usual. On the third day, however, after the disease had declared itself, it assumed the usual severity, and on the 2nd of February the cow died.

No. 2.—January 20th. A black and white half-bred Alderney heifer, successfully vaccinated by Mr. Acton, was inoculated with matter taken from the eye of the "bud" alluded to in No. 1. On the 25th this heifer showed symptoms, which on the 26th were well marked. This case was unusually severe, the disease ran its course very quickly, and the heifer died on the 30th.

No. 3.—January 13th. Inoculated a "bud" about five months old with matter taken from the eye of a sheep affected with the plague, this matter being diluted with six times its weight of milk was by means of a few threads of wood placed under the skin on one side of the vulva. On the 18th this animal showed symptoms of the plague. On the 20th it was placed in a box with the heifer No. 1, and on the the 21st it died.

No. 4.—January 7th. A healthy "bud," about five months old, was inoculated on each side of the

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vulva by three punctures and scarifications with lymph taken from a man affected with smallpox. No effect.

No. 5.—January 7th. A healthy "bud," six months old, was inoculated with lymph taken from a man affected with smallpox, the same as above. No effect.

No. 6.—January 8th. A healthy "bud," about six months old, was vaccinated with some vaccine lymph recently taken from the arm of a child. No effect.

No. 7.—January 8th. A healthy "bud," about five or six months old, was vaccinated with vaccine lymph as above. In this case it took on the fifth day after vaccination; there was a blush of redness around three of the punctures, viz., two on one side of the vulva and one on the other, and the skin was slightly tumefied. On the ninth day, the tumefaction and redness had increased and imperfect vesicles formed, after which the punctures scabbed over, and the usual characteristic phenomena followed. On the 7th of February, thirty days after vaccination, this "bud," although not purposely exposed, became affected with the Cattle Plague, and died on the 11th, four days after the disease had declared itself.

No. 8.—The "buds" Nos. 3, 4, and 5, were all re-vaccinated with lymph, taken from vesicles on the vulva of the Alderney cow of Mr. Acton, but without any effect in either instance.

The experiments instituted by us on the subject of vaccination are but few, yet we feel that they as conclusively prove the inefficiency of vaccination as a preventive against Cattle Plague as though they had been ever so numerous. The poison received into the system, both by direct inoculation and also infection by exposure, seems to have produced its effects with as much intensity and certainty of destruction to life as though the animals in question had never been vaccinated at all.

The period of incubation, the symptoms, mode of death, and the post mortem appearances were the same in character as those we have so often witnessed. Therefore we see no necessity for again describing them, as they will be found in the different sections of the report fully detailed.

In concluding this report, I may be allowed to state that which I verbally suggested to the Commissioners, viz., that inoculation with matter taken from a beast affected with the plague might be experimented with in the following manner:—six animals might be inoculated in succession, the matter being diluted at each inoculation. This experiment would prove whether a virus could be obtained capable of engendering a form of the disease so mild as not to endanger the life of a beast, and yet of a quality which would give animals an immunity from the malady.

GEORGE VARNELL.

REFORM CLUB
PALL MALL

A

SHEWS THE DENUDED CONDITION OF THE MUCOUS MEMBRANE OF THE LOWER LIP & GUM OF A CALF ABOUT FOUR MONTHS OLD, BEING ONE OF THE SYMPTOMS OF CATTLE PLAGUE

REFORM
PALL MALL

SKIN OF THE UDDER OF A COW SHEWING THE ERUPTION OF RINDERPEST IN A VERY UNUSUAL [illegible]

A.A.A. Shew the diffused reddened state of the [illegible]

REPORT TO HER MAJESTY'S COMMISSIONERS

ON THE

Treatment of the Disease and its Extension to Sheep,

BY THE

EDINBURGH CATTLE PLAGUE COMMITTEE.

COMMITTEE.

ANDREW WOOD, M.D., Chairman.

Professor Dick, V.S., Principal of Veterinary College.

James A. Hunter, M.D.

Henry D. Littlejohn, M.D., Health Officer for Edinburgh.

Douglas Maclagan, M.D., Professor of Medical Jurisprudence.

Dr. Lyon Playfair, C.B., Professor of Chemistry.

Charles S. Romanis, V.S.

Sir James Y. Simpson, Bart., M.D., Professor of Midwifery.

Professor Strangeways, V.S.

Professor John Wilson, Professor of Agriculture.

In the middle of November 1865, this Committee, at the request of the Royal Cattle Plague Commission, undertook to direct their attention principally to practical points connected with the prevention and cure of the Cattle Plague in Scotland. In transmitting this Report to the Commission, they divide it into the following heads, viz.—

I. THE TREATMENT OF THE DISEASE.

II. THE POSSIBILITY OF PREVENTING OR MITIGATING IT BY VACCINATION OR INOCULATION.

III. THE QUESTION OF THE LIABILITY OF SHEEP TO TAKE CATTLE PLAGUE.

I. THE TREATMENT OF THE DISEASE.

To this division of the subject the main attention of the Committee has been directed. With the view of eliciting information on the subject, they drew up and circulated extensively among veterinary surgeons and cattle owners chiefly in Scotland, but also to some extent in England, suggestions for treatment, with accompanying schedules, of which the following are copies, viz. :—

" The Edinburgh Committee on the Cattle Plague having been commissioned by the Royal Cattle Plague Commission to make observations and experiments in reference to the prevention and treatment of the Cattle Plague, have considered it desirable, in addition to the experiments on treatment which they propose to institute themselves, to obtain a record of observations and experiments made by as large a number as possible of qualified veterinary practitioners throughout the country. With this view, they have drawn out the following suggestions for methods of treatment of various kinds, prophylactic and curative, which they are anxious should be tested on an extensive scale. They have also drawn up a schedule for the purpose of rendering definite the record of the results of the methods of treatment suggested by them. These will be transmitted along with the suggestions themselves, and the Committee trust that practitioners who may make the experiments will have the goodness to fill them up and transmit them to the Chairman of the Committee, at 9, Darnaway Street, Edinburgh.

" The Committee, before specifying the various methods of treatment in detail, would premise a few general remarks, which they consider to be applicable to all cases.

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" First, *as to General Sanitary Measures, Disinfection, &c.*—The Committee content themselves with referring for full information on these matters to the Supplement of the Report of the Royal Cattle Plague Commission, which is in the hands of all veterinary inspectors.

" Secondly, *as to Food.*—The Committee deem it desirable to state it as their opinion, that, as a general rule, at all stages of the disease, and whatever treatment is used, food should not be pressed on the affected animal. They believe that too much, even of the softest food, is hurtful, the powers of digestion being so greatly impaired by the disease. During the earlier stages they believe that the safest articles of diet are oatmeal gruel, barleymeal gruel, with linseed tea, hay tea, or bran tea, and that little, if any, addition to these is needed. During convalescence it is also very necessary that the food should be both sparing and of easy digestion. The same diet as during the earlier stages may be continued, with the addition of mashes of well-boiled turnips or carrots, but in moderate quantity. When rumination commences to be re-established, a handful of sound hay, damped with salt and water, may then be given in addition.

" Thirdly, *as to the Maintenance of the Heat of the Animal.*—The tendency to chill of the surface is a marked feature of the disease, and it is very essential that the animal should be guarded against cold. The byre should be kept heated up to a temperature of 65 degrees. The animal should be thoroughly rubbed down from time to time, and be kept covered with an ample clean rug fastened on with a roller or band of any kind.

" Fourthly, *as to the State of the Bowels.*—In the early stages they are apt to be *constipated.* To remove this condition, mild laxatives may be required, but strong purgatives of all kinds are both unnecessary and unsafe. The best laxatives are either raw linseed oil, in a dose of a chopin-bottleful (an English quart), or from two to three ounces of flowers of sulphur mixed up with two pounds by weight of treacle and two chopin-bottlefuls of water. These doses may be repeated cautiously according to circumstances. Sometimes even in the early stages, but more frequently when the disease has continued for some days, *diarrhœa* (*scouring*) is apt to come on, and to prove irritating and exhausting to the animal. The simplest and best treatment for this symptom is one ounce of laudanum, mixed with a chopin-bottleful of limewater, repeated twice or even thrice a day if necessary.

" Having thus premised these general recommendations, the Committee proceed to state in detail, particular methods of treatment, classified under the heads of—

" A. DIAPHORETIC AND STIMULANT TREATMENT.

" B. ACID TREATMENT.

" C. RESTORATIVE TREATMENT WITHOUT DRUGS.

" D. PROPHYLACTIC TREATMENT.

" A. *Diaphoretic and Stimulant.*

" The Committee are anxious to give a full trial of the method of exciting sweating by means of the *vapour bath.* The method of using this agent is as follows :—The animal is to be placed in a stall enclosed on all sides, the height of the enclosure being a few inches more than that of the animal. Over the top of the box or enclosure thus formed is thrown a tarpaulin, which should cover it completely, with the exception that an opening is left sufficient for the animal's head to pass through. There is then to be placed on the floor of the enclosure, under the animal, a tub containing boiling water to the depth of half-a-foot. A continuous evolution of steam is to be maintained for half-

Edinburgh Cattle Plague Committee.

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an-hour by means of red-hot bricks thrown into the tub one after another. Under the use of this steam bath, if properly managed, the animal may be expected to become warm and to perspire profusely. After each vapour bath the animal should be washed with tepid water containing M'Dougall's disinfecting soap, taking care to dry it well after the washing. It should then be covered with an ample rug, kept, as already stated, closely applied to its body by means of a roller or band of any kind. The bath may be repeated either on the same day or following days, according to circumstances. During and after the bath the animal should be allowed a draught of cold water, which helps to promote perspiration. The objects chiefly aimed at by the use of the vapour bath are to promote the circulation at the surface, to relieve the congestion of the mucous membranes, and to eliminate the poison from the system.

" Combined with the vapour bath may be used various other remedies not incompatible with it, but calculated to aid its action.

" Several of these remedies the Committee now proceed to mention; it being, however, understood that only one of them is to be used along with the bath in each case where the experiment is made; they are not to be used together in the same case.

" A 1. *Oil of turpentine.*—This may be administered in doses of four tablespoonfuls, well shaken up with a chopin-bottleful of gruel, and may be given twice a day. This remedy may be expected to act beneficially by its powers of stimulating, and of exciting perspiration. It may probably also, in most cases where it is used, supersede the necessity for giving any laxative medicine.

" A 2. *Infusion of coffee.*—The method of preparing this remedy is by infusing two ounces of ground roasted coffee for a quarter of an hour in a chopin-bottleful of boiling water. It must, of course, be allowed to cool somewhat before being administered, and may be given in the above quantity every six hours. In addition to its stimulant and nutritive qualities, the coffee may act beneficially in consequence of the empyreumatic oil and caseine which it contains.

" A 3. *Carbonate of ammonia.*—This medicine, which has been found in many cases to act beneficially as a powerful diffusible stimulant, may be administered three times a day, in doses of half-an-ounce, either alone or preferably combined with three drachms of nitre dissolved in a chopin-bottleful of gruel.

" B. *Acid treatment.*

" This treatment is suggested in consequence of the alkaline state of the secretions which is found to exist uniformly in the Cattle Plague.

" B 1. *Diluted muriatic acid* is said to have been successful in Holland. It may be given twice a day in doses of three drachms mixed with a chopin-bottleful of gruel.

" B 2. *Vinegar.*—This may be used in doses of two ounces mixed with a chopin-bottleful of gruel, and may be given four times a day.

" C. *Restorative treatment without drugs.*

" This consists in carrying out in full the sanitary instructions of the Royal Cattle Plague Commission; in regulating the diet according to the instructions already given; in keeping the animal warm; and in administering two chopin-bottlefuls of good Scotch sweet ale three or four times a day.

" It is desirable that this system should be carried out in a certain proportion of cases, all drugs being rigidly abstained from.

" D. *Prophylactic treatment.*

" The Committee would further desire to draw attention to the importance of experiments being made as to the efficacy of prophylactic (protective) treatment, either in preventing the development of the disease, or modifying the intensity of the symptoms when the disease becomes developed in animals which have been exposed to the infection. In such cases, of course, all the sanitary measures of the Cattle Plague Commission should be strictly carried out. There may also be given at the earliest possible period *prophylactic* drugs, of which those most deserving of trial seem to be—

" D 1. *Sulphite of Soda,** given morning and evening in doses of one ounce dissolved in a bucketful of water.

" D 2. *M'Dougall's Solution,* of which a wineglassful in a bucketful of water may be given twice a day.

" D 3. *A mixture of half-an-ounce of sulphite of soda and two tablespoonfuls of M'Dougall's Solulion* in a bucketful of water may be given twice a day.

" It would have been easy for the Committee to have given a much longer catalogue of methods of treatment but this would only have been embarrassing to practitioners. In the suggestions made they have sought to combine simplicity, safety, and economy. Whatever the result of the experiments may be, all of them may be easily and cheaply carried out under almost any circumstances. It should be borne in mind that the results of the experiments, whether *positive* or *negative*, will be important.

" The Committee, in conclusion, beg to invite communications as to the results of treatment from practitioners, and are prepared to give their best consideration to any plans which may be proposed for experiment.

" In name of the Committee,
" Andrew Wood, M.D.
" Chairman.

" Edinburgh, 17th January 1866."

* The sulphite of soda is a prophylactic, and must not be confounded with sulphate of soda (or Glauber salts), which is a purgative, and not a prophylactic.

Form of Return as to the Results of Methods of Treatment recommended for trial by the Edinburgh Committee.

Cattle Plague Committee, Edinburgh.

Dr. Andrew Wood, Chairman.
Professor Dick, V.S.
Dr. James A. Hunter.
Dr. Littlejohn, Officer of Health.
Professor Maclagan, M.D.
Professor Lyon Playfair, C.B., LL.D.
Mr. Romanes, V.S.
Professor Sir J. Y. Simpson, Bart., M.D.
Professor Strangeways, V.S.
Professor Wilson, F.R.S.E.

Signature and Address of Veterinary Surgeon.

Place where Experiments made

Description of each of the Cattle, as to Breed, Sex, and Age.	State of Pulse, and Number of Respirations when Treatment was begun.		Date when the Symptoms first appeared.	Date of Commencement of Treatment.	Date of Termination of Treatment.	Result of Treatment.	Method of Treatment, and Remarks.
	Pulse.	Respirations.					

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These suggestions have been extensively tried, but a less number of the schedules which accompanied them have been returned accurately filled than the Committee hoped to receive. The deficiency was compensated for in part by the Committee sending some of their members to examine into cases which seemed to present peculiar interest.

After four months' experience of the disease, the Committee are obliged to retain the opinion which they formed at an early part of their inquiry, that there is no specific cure for the disease, and that the administration of drugs, instead of ameliorating the malady, in most instances aggravates it. It would not be difficult to give a number of apparent cures from each of the systems recommended for trial, viz. the prophylactic, diaphoretic, acid, and restorative treatment, but these are more than balanced by cases of failure. When careful nursing and a proper diet are given to a diseased animal, it has a fair chance of recovery, and often does recover in as large a ratio without as with drugs. Of all the methods of treatment which have come under the notice of the Committee, that which they have described under the name of *restorative treatment* is the only one on which they place any reliance.

This method of treatment aims at securing for the affected animal good hygienic conditions of warmth, cleanliness, and ventilation, a judicious diet, and careful nursing. If these conditions are secured, the proportion of recoveries is large; if they are wanting, the ratio of deaths is great.

In no branch of the subject have the Committee received more thorough proof than in regard to the paramount importance of regulating the diet. As soon as the disorder appears in a shed, all solid fibrous or raw food should be withdrawn from all the animals within the sphere of the influence of the disease, and should be carefully removed out of their reach. For litter of straw there should be substituted either sawdust or sand, so that fibrous food should not by any possibility reach their stomachs. Early after the disease begins, the stomachs lose the power of digesting uncooked or dry food, which becomes impacted, and produces, during the progress of the disorder, great aggravation of the symptoms. The experience gained in various parts of Scotland is that unless the cattle which are subject to the influence of the infection, but are not yet infected, be placed on proper diet for some time before they take the disorder, there is a diminished chance of their recovery. In the early stages of disease the appetite of an animal is but little affected, sometimes is even increased; but the digestive functions become quickly impaired, so that the food accumulates in the first, second, and third stomachs, till they become gorged. In this condition the animal has small chance of recovery. But if, instead of dry fibrous or uncooked food, mashes of boiled food be given, such as cooked turnips and carrots, with the addition of Indian meal, bean meal, or oatmeal, and with strong hay tea or gruel as drink, the diseased animal, except during one or two days in the worst part of the disease, when the febrile symptoms are most marked, is able to digest and assimilate such food, so that its strength is maintained and nature is aided to combat the malady. Even after convalescence, this soft food must be persevered in for a lengthened period. Many cases of relapse occur from permitting the animal to reach fibrous food too soon. In fact for several weeks during convalescence, boiled food should alone be given. Raw turnips, mangold, or hay, prove very hurtful, and not unfrequently fatal, four weeks after the crisis of the disease is passed. In such cases, even when the symptoms of the actual plague have disappeared, cerebral affections often supervene, and the animal dies in convulsions or "stomach staggers."

Mr. Romanis, V.S., one of the members of the Committee who has had personal experience of this disease in Russia, had an opportunity, through the kindness of Lord Binning, of going down to Cheshire, in order to apply this method of dieting on a large scale during the prevalence of the Cattle Plague in that county, and he also was good enough to visit various districts in Scotland, at our request. It is chiefly through his exertions that we have been enabled to obtain precise results as to certain modes of treatment. This method of feeding cattle, familiar enough to the Scotch farmer, is less usual in England, so that considerable difficulties were experienced in that country, in inducing proprietors of animals to adhere rigidly to the system.

We believe that the familiarity of the custom of feeding cattle on mashes in Scotland accounts largely for its favourable position in regard to the recoveries of animals attacked by the disorder. Up to January the per-centage of recoveries in the different parts of the kingdom was as follows:—

England, recoveries	-	9·1 per cent.
Wales, "	-	11·1 "
Scotland "	-	17·8 "

From the want of familiarity of the use of cooked food for cattle in Cheshire few facilities for making mashes exist even in large farms in that county. The cattle, especially the Alderneys, do not take willingly to this kind of food, unless they have been habituated to it before the disease breaks out. If presented to them for the first time in the height of the malady they refuse mashes, although they will take hay tea, which is, however, not sufficient to support their strength during the progress of the disease. Drenching cattle with gruel is not desirable. They must be got to take food without force, or it is positively injurious during the disease.

In small farms in Scotland, and in small stocks in Cheshire, such as those belonging to cottagers, where individual nursing was possible, and where the number of cattle did not exceed the culinary resources of the farmers or cottars, the number of recoveries under this system of dieting was considerable, as the following table will show.

TABLE I.—Results of Treatment of Small Stocks not exceeding 12 Cows.

Name.	Place.	Number of Diseased Cattle.	Deaths in 4 Weeks.	Apparent Re-coveries.	Deaths from Relapses by giving dry hay, &c. too soon, from 4 to 8 weeks.
B. -	of E. -	11*	4	7	7
W. -	" F. -	10	0	10	0
W. -	" D. -	7	0	7	2
B. -	" U. -	4	0	4	0
D. -	" S.T.	3	0	3	0
I. -	" U.H.	12	0	12	0
S. -	" H. -	5	1	4	0
S. W. -	" H. -	3	0	3	0
P. -	" H. -	1	0	1	0
W. -	" C. -	1	0	1	0
I. -	" C. -	3	2	1	0
W. -	" I. -	5	0	5	2
C. -	" D. -	4	0	4	0
W. -	" D. -	3	0	3	2
H. -	" C.C.	3	0	3	0
H. -	" N. -	2	0	2	0
C. -	" N. -	7	1	6	0
V. -	" S. -	4	4	0	0
D. -	" U.H.	7	0	7	0
		95	12	83	13

By this table it will be seen that in the case of small stocks not exceeding 12 cows the total deaths of animals severely attacked by the plague were only 26·3 per cent., of which 13·7 per cent. were due to relapses, chiefly caused by injudicious diet from hay, raw turnips, or cabbages having been given too soon after convalescence.

As the number of cattle in the stocks augments, the difficulty of providing mashed food increases also, and

* NOTE.—These 11 cows were "Alderneys," which showed great repugnance to mashes, and could not be properly fed.

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there is less nursing given to each animal; the deaths then are more frequent, as the following table shows:—

TABLE II.—Results of Treatment of Stocks from 15 to 30 Cows.

Name.	Place.	Number of Diseased Cattle.	Deaths in 4 Weeks.	Apparent Recoveries.	Deaths from Relapses by giving dry hay, &c. too soon, from 4 to 8 weeks.
Mr. K.	of B.C.	20	2	18	0
„ H.	„ C. -	12	2	10	6
„ W.	„ H. -	24	4	20	10
„ A.	„ C. -	27	9	18	12
„ A.	„ D. -	22	6	16	0
		105	23	82	28

By this table it will be seen that in large stocks of from 15 to 30 cattle the total deaths were 48·5 per cent., of which 26·6 per cent. resulted chiefly from cerebral affections following in great part from a too speedy return to raw food.

In the next table we give cases treated with mashes from the commencement of the disease, but which, from the difficulty of continuing them, degenerated into dry hay or raw turnips during convalescence. The table also contains a certain number of cases treated on a mixed regimen of hay and mashes all through the disease.

TABLE III.—TREATMENT of Stocks from 30 to 80 Cows.

Name.	Place.	Number of diseased Animals.	Deaths in 4 weeks.	Apparent Recoveries.	Deaths from Relapses by giving dry hay, &c., too soon—from 4 to 8 weeks.
Fed on mashes at commencement. Mr. H.	of F.	52	7	45	29
„ B.	T.	37	7	30	21
„ C.	H.	59	10	49	35
„ C.	R.	29	7	22	6
Mashes and hay. „ C.	U.H.	60	31	29	20
„ W.	U.H.	66	51	15	12
		303	113	190	123

This table shows an increase of mortality on this mixed food, as the deaths now amount to 77·8 per cent. The table is instructive in another point of view, for while 82 per cent. of the animals apparently recovered at the end of four weeks when fed on mashes, 35 per cent. only made that apparent recovery when fed on the mixed diet.

To contrast with these tables we give the results of treatment where animals were fed on hay or raw turnips, but were medically treated according to many of the remedies and systems of treatment which have at different times been recommended as specifics.

TABLE IV.—Cases of Cattle fed with dry or raw food, and medically treated.

Name.	Place.	Number of diseased Animals.	Deaths in 4 weeks.	Apparent Recoveries.	Deaths from Relapses from 4 to 8 weeks.
N. -	R. -	50	38	12	8
N. -	F. -	80	71	9	0
I. -	U. -	58	46	12	5
D. -	P. -	52	45	7	0
E. -	W. -	70	55	15	0
		310	255	55	13

We now find that the deaths reach 86·5 per cent., and that 82·2 per cent. die within four weeks. This table, when brought into contrast with the preceding ones, shows how little reliance is to be placed on medical remedies; and also at the same time the extreme importance that strict attention be paid to the diet of the diseased cattle.

If we collate the evidence derived from the preceding tables, the comparison will be found of interest.

Table of General Results.*

Tables.	Number of cattle.	Per-centages of deaths within 4 weeks.	Per-centages of deaths between 4 and 8 weeks.	Apparent recoveries, per cent.	Real recoveries, per cent.
I. Cottars cattle generally treated with mashed food	95	12·6	13·7	87·4	73·7
II. Larger stocks, where dry food was often given during convalescence -	105	21·9	26·6	78·1	51·5
III. Cattle treated with mixed food of mashes and hay - - - -	303	37·2	40·6	62·8	22·2
IV. Cattle fed with dry food, and treated medically with drugs - - -	310	82·2	4·2	17·8	13·6

An inspection of this table shows, in a very decided way, that the per-centage of recoveries largely depends upon the withdrawal of all dry and raw food, not only during the course of the disease but also during convalescence. Under such treatment, combined with good nursing, about three fourths of all the animals attacked were found to recover, while even under a less severe continuance of the regimen about one half recovered.

To ascertain how far the relapses were due to dry food given during convalescence, when animals died between four and eight weeks after being attacked, numerous post-mortem examinations were made, of which a few are given as examples. We confine the results to the state of the ingesta.

No. 1. Post-mortem examinations of animals which died during 1st week, having been feed with usual food of hay, straw, and raw roots.

Mr. W.	of U.	3 carcases	Found the 1st stomach full of undigested hay or straw. The 3rd or maniplies impacted with food, quite dry and hard, resembling oil cake, and the pieces between the layers came out in one lump. All the usual appearances of disease present.
„ L.	„ C.	1 „	
„ I.	„ E.	1 „	
„ G. & others.	„ E.	1 „	

No. 2. Post-mortem examinations of animals which died in 2nd week when fed on mashes for one week without hay.

Mr. W.	of U.	1 carcase	Found the 1st stomach full of hay and straw. The 3rd full of fibrous matter, hay and straw, &c., but moist, and broke to pieces when removed. The 4th stomach as usual was highly congested, and nearly empty in cases where there was purging before death.
„ V.	„ S.	2 „	
„ N. and others.	„ R.	1 „	

* The whole of these tables have been drawn up from the gross returns received by the Committee, and therefore necessarily without any knowledge on the part of the cattle owners of the conclusions to which the Committee have been led from their discussion.

No. 3. Post-mortem examinations of animals fed on mashes for three or four weeks.

Mr. B.	of E.	2 carcases	Found 1st stomach contained less quantity of undigested hay, but in no case were boiled roots found undigested. The 3rd stomach contained more fluid, and the caked matter was breaking up into pieces and becoming dissolved. 4th stomach generally contained a large quantity of fluid.
„ E.	„ T.	2 „	
„ H. and others.	„ B.	2 „	

No. 4. Post-mortem examination of animals which died in the fifth to the eighth week :—

Numerous relapses, where in many cases the animals were giving a large quantity of milk again, some as much as 12 quarts, besides what the calves got. In most cases they were not known to have got hay for three and four weeks. In other cases the attendants, against orders, had given the animals a small quantity of hay daily, which had not been digested. In these cases the symptoms were all those of indigestion with constipation; in some, however, with diarrhœa. Most of them died in convulsions, with the usual symptoms of stomach staggers.

Mr. H.	F.	6 carcases	On examination there was found in the first stomach invariably from one to three pailfuls of undigested hay, straw, or husks of oats and wheat.
„ B.	E.	3 „	
„ W.	T.	1 „	
& others.	—	—	

While we think that our experience amply bears out the statement that good nursing and soft cooked food as diet are the main requisites for recovery, it is obvious that this regimen must occasionally be accompanied by simple remedial treatment. Thus, when the animals are costive, a gentle laxative, consisting of a quart of linseed oil, is administered. If this be not sufficient, a pound of treacle, given every six or eight hours, generally produces the desired effect. When, on the contrary, the animals are purged, a pint of a strong decoction of oak bark, or lime water, with an ounce of laudanum, may be given every three hours till the diarrhœa ceases. In some cases, when this did not prove effective, we have found peroxide of iron useful. At first, under the impression that stimulants were indicated, we administered freely Scotch sweet ale and whisky, but on the whole found that they should be given sparingly and judiciously. Carbonate of ammonia seemed in many cases to be better as a stimulant than alcoholic beverages, and even spirit of turpentine could be substituted for these with advantage, especially when the stomach of the animal was distended with gas. In order to prevent local irritation of the throat, the turpentine should be shaken up with olive or linseed oil in the proportion of half a pint of the latter to one or two ounces of the former.

Occasionally local applications were found to be of use. When the larynx is severely affected, which is perceived by the animal standing with the head stretched out, gasping for air, the mouth being open, and the tongue protruding and of a purple colour while the respiration is impeded, great relief is given by fomenting the throat with nearly boiling water, having first applied a flannel bandage. After doing this for a quarter of an hour, spirits of turpentine were rubbed in, and a dry bandage was applied. This treatment, though apparently severe, requires to be repeated every hour till the skin is blistered. In cases of paralysis, when the animal is unable to rise, relief is given by stimulating the whole of the spine by rubbing in spirits of turpentine with a brush.

During the experiments on adult cattle, as above described, between 40 and 50 calves have also been brought under treatment. The disease was pronounced severe in all these cases, the lining membrane of the mouth being of a dark purple colour, and the rings on the gums being broader and more distinct than in the cow. The only diet which we found suited to them was milk, and we did not hesitate to feed them on rinderpest milk. With such diet few of the calves succumbed to the disease. With other food the chances of recovery are small. Drugs were as much as possible dispensed with, and when administered were found to act injuriously. Only in cases of constipation a little linseed oil was given, or in cases of diarrhœa a decoction of oak bark.

II.—The Possibility of preventing the Disease by Vaccination or Inoculation.

In regard to vaccination it may perhaps appear unnecessary to say much now, seeing that it is universally conceded that the proof has failed of the identity of smallpox and Cattle Plague, and that an extensive series of costly experiments made throughout the country has shown that cowpox, whether natural or inoculated, does not seem either to prevent or to mitigate Cattle Plague. It may not, however, be without interest, even at this period, to advert shortly to some of the experiences of the Committee in relation to this matter, acquired while the question was still an open one.

The Committee having ascertained that at Craigsanquhar (near Cupar-Fife), the seat of N. Spens, Esq., the cattle in his byre had during the summer suffered severely from undoubted cowpox, and that subsequently one of them had taken Cattle Plague, and died of it, whilst the rest remained unaffected, suggested the expediency of placing one of these cattle, which had thus escaped, in a byre with cattle suffering under Cattle Plague. Accordingly one of them, a cow in calf, which was selected by Mr. Baird, V.S., Cupar-Fife, as having had to his personal knowledge cowpox in an aggravated form, was placed on the 20th January 1866 in a byre 12 yards long by 6 yards wide, with high roof, well ventilated, where there were at the time five cattle labouring under Cattle Plague. She became slightly indisposed on the 1st of February, that is to say, on the eleventh day after exposure, and gave birth to a fine calf on the 2nd. Two days afterwards, that is to say, on the thirteenth day after exposure to infection, the cow showed all the symptoms of Cattle Plague in the worst form, and died on the 6th. The calf did well until the 5th, when it also sickened, and speedily succumbed to the disease.

The Committee have had several cases reported to them, in which cattle which have had Cattle Plague and have recovered have within a fortnight thereafter been attacked with cowpox, showing that Cattle Plague no more protects from cowpox than does cowpox from Cattle Plague.

The Committee with difficulty, on account of the regulations against the moving of cattle which were strictly enforced in Scotland, obtained by purchase three calves for the purpose of making experiments in vaccination and inoculation, chiefly with a view of determining whether vaccine or smallpox virus introduced into an animal mitigated the disease acquired either by direct inoculation with Rinderpest virus or by infection. Though these experiments were necessarily made on a limited scale, yet as they were carefully watched throughout by members of the Committee, assisted by Mr. Walker and Mr. Turnbull, intelligent veterinary students, who acted as clinical clerks, it may not be without interest and instruction to give details regarding them.

On the 6th of January a calf five months old was vaccinated on the lining membrane of both ears. On the 11th, no effect being observed, the animal was subjected to a second attempt, the operation being this time performed on the lower surface of the tail and in the groin. This last operation seems to have had the effect of hastening on the progress of the first operation, for on the 18th two large crusts were found on the inside of both ears. In order to test whether these were the result of a true vaccination (the vesicles themselves not having been observed), the crusts were removed, and dissolved in water, and with the softened matter two infants were vaccinated on the 19th January. On the 30th, on one of the infants was observed a characteristic vaccine vesicle, the vaccination having reached its acme

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on the tenth day, thus proving that the calf had passed through the true vaccine eruption.

On the 11th January, another cow calf was vaccinated, and on the 13th a bull calf was inoculated with smallpox matter; neither of these, however, showed signs of the vaccination or inoculation having taken, although in both cases the operation was repeated.

In consequence of the Russian experiments made by Dr. Thiele in Kasan, it was considered desirable to ascertain whether a mixture of the Cattle Plague virus with milk would have any effect in mitigating the intensity of the disorder. The passage of smallpox virus, into cowpox virus appeared to have been established by these experiments, and by others of a like kind performed by Dr. Sanderson in Madras. While, therefore, there still remained reason to believe that the Cattle Plague was the analogue of human smallpox, it was a legitimate and desirable experiment to make, in the possibility that a dilution of the plague virus with milk might be attended with similar mitigating effects as in the case of human smallpox. Accordingly virus taken from an ox in the height of the disease, and also from one in a convalescent condition, was mixed with five times its bulk of milk, and exposed to the temperature of 95° Fahr. in sealed tubes for six hours. Threads were then moistened with the mixture, and after being dried at the temperature of the air were introduced as setons into the dewlaps of two calves, in one of which the smallpox virus had not taken effect, and in the other in which vaccination had failed.

In the first case of inoculation in which virus had been taken in the form of tears from the eyes of an animal in the height of Cattle Plague, the inoculation with the diluted virus was effected on the first of February. On the 6th of February the temperature of the animal was raised, and on the 7th the symptoms of the disease were well established. The disorder ran its course in the usual way, without the slightest mitigation, and the animal died on the 13th.

In the second case of inoculation the virus was taken from a cow which had been chewing the cud for two days, after a severe attack of the disease. The tears were diluted with milk, and treated as in the preceding case. In this instance the inoculation had no effect.

From the 1st February to the 12th February the animal remained unaffected. In this case the whole power of the virus seemed exhausted, either during convalescence of the animal from which it had been taken, or possibly by the treatment which it received. That the calf was susceptible of the disease was shown by the fact, that on the 12th, or six days after the disease broke out in the first inoculated calf, this second calf took the disorder, and on the same day the third calf, which had been successfully vaccinated, also showed the first symptoms of the malady. In these three cases, therefore, one by inoculation and two by infection, the period of incubation was precisely the same, viz., six days.

As the two latter cases resulted from infection, we do not think it necessary to give the detailed description of the progress of the disease, which was treated on the restorative method, by hot mashes of turnips and gruel, with the addition of three pints of ale daily. Notwithstanding that the disease was as severe in its symptoms as in the first case, the two calves recovered, and are now quite well.

These experiments are of too limited a range to justify any general conclusions, but, so far as they go, they seem to point to the following facts:—

1. That a milk dilution of plague virus taken in the height of the disease does not mitigate it.
2. That in the single case tried, the milk dilution appeared to destroy the virus of a convalescent animal; the calf, however, got no protection from this inoculation.
3. That neither vaccine virus nor smallpox virus appeared in any way to diminish the susceptibility to attack or the severity of the disease.

Had we not experienced so much difficulty, on account of the state of the law against the movement of cattle, in procuring animals for inoculation, other experiments would have been tried. Among these was one suggested by Professor Wilson, of mixing vaccine virus with rinderpest virus, in the hope that they might mutually act on each other with a possible diminution of the intensity of the latter.

III.—The Question of the Liability of Sheep to take Cattle Plague.

The committee have, ever since their appointment, had their attention directed to the question as to the liability of sheep to be infected with Cattle Plague. They were aware of the observations made abroad, in Austria and Poland, and also in England, especially in Norfolk, which seemed to prove that sheep are liable to the disease, though by no means so liable as cattle, nor to the disease in so severe a form.

The first experiments made at Edinburgh in October 1865, in regard to sheep, seemed, by the negative results obtained, rather to militate against the liability of sheep to take Cattle Plague, and also against their liability, though free from the disease themselves, to carry the infection to cattle in their wool or otherwise, after having been kept in close and continuous contact with diseased cattle. Ten sheep, of different breeds and ages, viz., two aged Cheviot sheep, two three-year old ditto, two Danish sheep, two Swedish sheep, and two lambs, were placed at the suggestion of the Messrs. Swan, cattle dealers, in the Edinburgh sanatorium, a large house made of wood, where cattle labouring under the plague were being treated. They were kept for 14 hours out of the 24 confined in the sanatorium, in contact with the worst possible cases of Cattle Plague. During the remaining 10 hours they were allowed to graze in an adjoining paddock, not far from the pits in which the carcases of very numerous cattle, dead of the plague, were being buried. They were kept in the sanatorium for 24 days, at the end of which time, Professor Dick, V. S., gave a certificate to the effect that they were clear of any disease whatever.

Eight of these sheep were next, as had been suggested by Dr. Andrew Wood, Chairman of this committee, removed from the sanatorium, and immediately placed in a small field along with four cattle, viz., one short-horn cow, one calf, and two foreign cows. The cattle and sheep were kept thus together for over 30 days, at the end of which period they were again inspected by Professor Dick, V. S., who certified them all to be in good health.

Had these experiments stood alone, or been corroborated by experience elsewhere, one might legitimately have drawn the conclusion that sheep are not susceptible of Cattle Plague, and that they will not convey the disease to cattle; but later experiments and observations, of which the Committee have been personally cognizant, as will appear in the sequel, have unfortunately tended to prove the erroneousness of these conclusions.

Two of the sheep which were the subjects of the first experiment as related above, instead of being taken to the field to be herded with cattle there, were placed in an experimental byre in which Dr. Smart was treating cattle affected with the plague. They were placed in a stall in which two cows had just died from the most virulent type of the disease, and they were also allowed to go about the cowhouse in which several diseased animals were under treatment. Both of the sheep remained perfectly well for nearly three weeks, when one of them became sickly. The animal, it is stated, from showing loss of appetite, went through all the usual stages of Cattle Plague, though in a modified form, and then recovered completely. The other sheep continued quite well. The result of this experiment might seem to warrant, in some degree, the conclusion that sheep exposed to Cattle Plague may take the disease in a modified form, but it could not be deemed conclusive, as there were no decisive means of verifying the fact that the sick sheep had had an attack of real Cattle Plague.

About the same time, or soon after these experiments were made, other experiments bearing upon the point in question were being tried in Edinburgh, at the request of the French Government, by Dr. Arthur Gamgee. In a first series of experiments four sheep were kept in the same stable with animals seriously affected with Cattle Plague, and were besides inoculated with the secretions obtained from the same animals. The results were entirely negative. In a second series of experiments four sheep were inoculated with the lachrymal secretions and with the milk of cows affected with the plague. On the sixth day after the inoculation one of the sheep showed symptoms of illness. Subsequently all the characteristic symptoms of Cattle Plague became developed, and the animal died some days after. In this case a post mortem examination was made by Dr. Arthur Gamgee, assisted by Dr. Turner, Demonstrator of Anatomy in the University of Edinburgh, and in the presence of Drs. Andrew Wood and Douglas Maclagan, members of the committee, who had been kindly invited to attend. Lesions, considered by all present to be characteristic of Cattle Plague, were found in the mouth, in the air-passages, and especially on the surface of the mucous membrane lining the fourth stomach and small intestines. In the hope of making the experiment more conclusive, some days before the death of the sheep a young calf had been placed in the same stable, and had been inoculated with the secretions of the sick sheep. In spite of this inoculation, and of a prolonged sojourn in the same stable, the calf did not become affected.

Not long after that the liability of sheep to take Cattle Plague was unequivocally proved to the satisfaction of all the members of the committee. On the 30th November 1865 a single sheep (a gimmer) was brought for slaughter to the Edinburgh slaughter-house from the Dean Farm in the immediate vicinity of Edinburgh. No case of Cattle Plague had occurred in the cattle of that farm, but the disease was known to be prevalent in adjoining farms. Several sheep from the same farm had during the previous fortnight been brought to the slaughter-house in a weakly condition in carts,—an unusual circumstance. In them, though some slightly suspicious appearances like those of Cattle Plague were noticed by the intelligent inspector of the slaughter-house, yet, as he shared the impression generally held at that time in Scotland that sheep were not liable to the disease, he did not consider it necessary to take action in the matter, nor did he feel warranted in condemning their flesh as diseased meat, and unfit for food. In the carcase of the sheep in question, however, the appearances seemed to him unequivocal, quite identical in fact with those observed in Cattle Plague amongst cattle. He requested Dr. Littlejohn, the officer of health for the city of Edinburgh, and Dr. Andrew Wood, to examine the carcase, and they had no difficulty in recognizing the well-known lesions of Cattle Plague, viz., the peculiar redness and roughness of the lining membrane of the mouth, the flush of deep redness on the lining membrane of the fourth stomach and the intestines, and the peculiar change of colour of the flesh. These appearances were afterwards examined by the other members of the Committee, who were unanimously of opinion, that the sheep had been infected with undoubted Cattle Plague. The farm from which the sheep had been sent was visited on the day following by some members of the Committee, but they found that already the whole flock, consisting of upwards of 100, had been removed for slaughter at some distance from the farm.

For several months after the date of the last observation no facts bearing on the question of sheep in connection with Cattle Plague came under the personal cognizance of the Committee. They did not hesitate, however, when consulted, as they were by some of the Scottish county officials, to state their conviction that sheep were liable to take Cattle Plague, and to recommend, consequently, caution in moving sheep from infected to non-infected districts. During the last fortnight, however, cases of the disease amongst sheep have been reported from the counties of Forfar and Fife. The committee are personally cognizant of the facts in regard to the Forfarshire cases only from having had the opportunity of inspecting one of the heads of the diseased sheep which was sent to Edinburgh. This inspection left little doubt on the minds of the members who made it as to the fact that the animal had laboured under Cattle Plague. With the facts in regard to the Fifeshire cases the Committee are more conversant, because Professor Strangeways, V.S., one of their number, went down on the 3rd March 1866 to Fife specially to make inquiry into the circumstances. He found that a flock of 170 sheep (hoggets) had been confined in cattle courts where cattle had died of the Plague previously to the sheep being put in there; that a very considerable number of them had sickened, and were affected, when he saw them, with all the symptoms of Cattle Plague, viz., drooping ears, discharge from the eyes and nose, grinding of the teeth, eyelids swollen, and eyes inflamed, cough, appetite gone, and great prostration, some of the sheep being so weak as to be unable to stand, even for a few minutes. Several of the sheep had, in their armpits and flanks, well-marked pustules, like those observed in some cattle affected with the Plague. Professor Strangeways made a post mortem in the case of one of the affected sheep which he caused to be slaughtered. The appearances found were these; viz., windpipe slightly congested, but filled with frothy mucus; lungs and liver healthy; first, second, and third stomach slightly congested; fourth stomach in a state of extreme congestion; congestion of the intestines, especially the smaller ones; gall-bladders filled with thick dark bile. There was a considerable number of deaths, but very much less proportionally than in the case of cattle dying of Plague. Other sheep on the farm, to the number of 200 or 300, were all apparently in good health; none of them had been confined in cattle courts, but had been kept in the fields.

Professor Strangeways, three days afterwards, visited another steading (Cults) in the west end of Fife, and there, on examination into the facts, assisted by Mr. Aitken, V.S., of Dunfermline, he found a number of ewes in an advanced stage of the disease. These ewes, on the snow coming on, had been removed from the fields into a court where cattle had died of the plague. Several of the ewes aborted. On making a post-mortem of one of the sheep which had died, Professor Strangeways found in a well-marked form the characteristic lesions of Cattle Plague.

A day or two afterwards, the carcase of one ewe and the abdominal viscera of two other sheep were brought for examination to the Edinburgh Veterinary College by Dr. Dewar of Kirkaldy. These were examined by Professors Dick, V.S., and Strangeways, V.S., members of this Committee, and also by Dr. Young, Lecturer on Physiology and Histology to the Veterinary College, who all agreed as to the nature of the disease and confirmed Dr. Dewar in the opinion he had expressed that these sheep had died of Cattle Plague. In the carcase of the ewe was found a well-developed fœtus which showed the characteristic lesions of Cattle Plague.

Such is the experience of the Committee regarding Cattle Plague in reference to sheep. The conclusion at which they have arrived is that sheep are liable to Cattle Plague, may be inoculated with it, or may take it by infection communicated from cattle labouring under the disease, or from being placed in byres or courts where cattle have recently died of the disease; that they are by no means so liable to take it as cattle, and that they do not generally take it in so severe and fatal a form. The Committee need hardly add that, holding these opinions, they recommend the utmost caution in the moving of sheep, especially from infected to non-infected districts, and would strongly advise that sheep fairs and markets should for a time be stopped.

One other remark which the Committee would make is in reference to the treatment of sheep labouring under Cattle Plague. They find that the same dietetic treatment which has already been proved to act so beneficially in the case of cattle is equally successful in the case of sheep.

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The Committee may add, in conclusion of this part of the subject, that during the course of treatment of adult cattle they have met five or six instances in which goats were present in contact with them. With the exception of one goat, all the others took the disorder, but in a mild form, and ultimately recovered.

The Committee, in concluding their report, beg to add a few practical observations which have been suggested by their experience of the disease, and by the information which they have derived regarding it in various ways.

The Committee have detailed what, so far as they are able to judge, appears to them to be the best treatment, yet they think that a very important question remains; ought treatment, when Cattle Plague comes into a new locality, to be attempted at all? Ought we not, guided by the experience of old authors, amongst the rest, Lancisi in Italy, and Bates and Layard in Great Britain, who saw the disease during the 18th century, to adopt slaughter as the best course, the only one indeed that should be followed? When we consider how virulently contagious the disease is, sparing very few cattle which are brought in contact with it, and how fatal it is even where the per-centage of recoveries has been at its highest; when we consider the cost of treating the animal, and more especially the large amount of infectious matter which is being continually generated from every animal whilst under treatment, as also the great risk of this infection being spread abroad in some way or other even to a distance by the air, by dogs, attendants, manure, &c.,—it can hardly be doubted that the best and wisest plan, looking to the general good, is to slaughter and stamp out, as was done with success, by advice of Bates, in Britain, in 1714, and by advice of Layard, in Britain, in 1769, and also in Aberdeenshire during the present epizootie.

The isolation of healthy from diseased cattle should obviously be as complete as possible, and with the view of carrying out this important object there ought to be a stoppage of cattle and sheep fairs. The interruption for a season, as far as possible, of the transit of sheep and cattle, as recommended by the Cattle Plague Commission, more than four months ago, and the establishment of dead meat markets, are, in the opinion of this Committee, measures of vast consequence.

But, in addition to all this, the Committee feel convinced that the strongest measures of slaughter or isolation would prove ineffectual in eradicating the disease from the country unless they are accompanied at the same time with thorough systems of disinfection applied to byres, litter, manure, and everything which has come in contact with diseased animals. If this be not done, the germs of the disease will spring up from a thousand centres, after the country has been liberated from the suspension of traffic, and thus the sacrifices made by the country will have been made in vain. The Committee trust that Government will prepare a system of supervision likely to ensure this thorough disinfection over the whole country, and will not rely merely on the efforts of individual farmers or local authorities, who may—as the Committee, from authentic instances reported to them, can testify,—from ignorance or indifference, neglect to adopt the means necessary for thoroughly destroying the lurking seeds of a disease so contagious and so disastrous.

By order of the Committee,
ANDREW WOOD, M.D.,
Chairman.

APPENDIX B.

Recommendations for Disinfection.

On the 19th February the Commissioners were requested "to furnish the Lords of the Council with "a summary of the best rules that can be laid down on "the subject of cleansing and disinfection in reference to "Cattle Plague."

On the 23d February the subjoined recommendations were transmitted to the Privy Council Office, together with the following letter:

Cattle Plague Commission,
2, Victoria Street, Westminster, S.W.
Sir, 23d February 1866.

In reference to the subject of your letter of the 19th instant, I am desired by the Commissioners to send you, for the information of the Lords of the Council, the enclosed practical suggestions respecting the best modes of disinfection.

It has been the aim of the Commissioners to make these suggestions simple as well as brief.

The methods here recommended are not the only ones which might be employed, but they are those which the Commissioners believe, from scientific investigation and from actual trial, to be on the whole the best for use—the most likely to prove efficacious as well as the readiest and the most completely free from risk.

It is hardly necessary to add that the success to be hoped from disinfectants must depend on their being applied thoroughly and with care, and that they will not dispense with the necessity for cleanliness, but require, on the contrary, strict attention to it.

I am, Sir,
Your obedient servant,
Arthur Helps, Esq. &c. &c. &c. MOUNTAGUE BERNARD.

RECOMMENDATIONS FOR DISINFECTION.

Recommendations on this subject may conveniently be ranged under the following heads:—

1. The cleansing of sheds, infected or otherwise; of markets; slaughter-houses; lairs, &c.
2. The cleansing of waggons, trucks, lairs, &c.
3. The disposal of manure or litter.
4. The disposal of carcases of infected animals.
5. The disposal of blood, offal, and hides of apparently healthy cattle which have been killed after being in contact with infected cattle.
6. Precautions to be taken by butchers, inspectors, and others, who visit farms for the purpose of seeing or killing diseased beasts.
7. Further disinfecting measures which may be useful in infected or endangered farms.

1. *The cleansing of Sheds, infected or otherwise; of Markets; Slaughter-houses; Lairs, &c.*

Wash the woodwork of the sheds everywhere with boiling water, containing in each gallon a wineglassful of carbolic acid.

Then limewash the walls and roof of the shed with good, freshly burnt lime, adding to each pailful of whitewash one pint of carbolic acid.

Cleanse the floors thoroughly with hot water, and then sprinkle freely with undiluted carbolic acid.

Lastly, close all the doors and openings, and burn sulphur in the shed, taking care that neither men nor cattle remain in the shed whilst the burning is going on.

Allow the shed to remain closed for at least two hours; then open doors and windows. About one pound of sulphur is sufficient for a 10 or 12 stall shed. The sulphur should be burnt in the centre of the shed, so as to get the fumes diffused everywhere. It may be placed on a shovel of burning coals.

Recommendations for Disinfection.

This process should not only be used in sheds where infected cattle have been kept, but also where there is any reason to apprehend the presence of infectious matter on the premises. When disease is in the neighbourhood, it may be usefully employed once a week.

In cleansing sheds from which the cattle cannot be removed, sulphur must not be used. In such a case, follow the above instructions, omitting only the fumigation with sulphur.

All markets, slaughter-houses, lairs, and places where cattle have been customarily collected, must be carefully and thoroughly disinfected in the above manner before they are used again, the manure, blood, and offal being treated as directed in sections 3 and 5.

2. *The cleansing of Waggons, Trucks, &c.*

Well scrape the boards of the truck or waggon, and burn the scrapings. Then wash everywhere with *boiling* water, containing a pound of common washing soda to a pailful. Then wash again with chloride of lime or carbolic solution, as in section 1.

3. *Disposal of Manure or Litter.*

The most effectual way of disposing of manure is to burn or bury it; but if neither plan can be adopted it may be ploughed in. Before burying or ploughing it in, water it well every day for a few weeks with the carbolic solution by means of a watering pot or hose. When the disinfectant has well penetrated, remove the heap to some neighbouring arable land, and immediately plough it deeply in; care being taken that the whole of it is buried.

If there is no arable land available, place the manure, after the above treatment with carbolic acid, in a heap in a field. After a final watering with carbolic acid, cover it with at least one foot of earth. If the heap has to be packed over, previous to being applied to the land, water it once more with carbolic acid, and cover it again with earth

Carefully cleanse and disinfect by sponging with the carbolic solution all carts and tools used in moving the manure, and the boots of the men, as well as the feet and legs of the horses. After the manure has been removed from the premises, thoroughly disinfect the yards by the method given in section 1.

Add carbolic acid to the liquid manure in tanks, in the proportion of one pint daily to every hundred gallons.

4. *Disposal of Carcases of disinfected Animals.*

Bury the carcase six feet deep; cover it well with good quicklime, mixed with carbolic acid in the proportion of half a gallon to each hundred weight.*

5. *The diposal of Blood, Offal, and Hides of apparently healthy Cattle which have been killed after being in contact with infected Cattle.*

Carefully collect all blood and offal; mix with a little carbolic acid, and then bury.

Disinfect hides and thorns either by washing with the solution of carbolic acid, or by soaking in a solution of chloride of lime.

Dealers in hides consider it advisable to remove the moisture by covering them for 12 hours with common salt before they are soaked in the above solutions.

6. *Precautions to be taken by Butchers, Inspectors, and others, who visit Farms for the purpose of seeing or killing diseased Beasts.*

The greatest care as to cleanliness is necessary in the case of butchers and others who go to farms to kill or see infected animals. They should never go near healthy beasts in their infected clothes. They should wash carefully and dip their boots in the carbolic solution, and

* Wherever *carbolic* acid is mentioned it must be understood that either this or *cresylic* acid may be used indifferently. These two agents are derived from coal tar, and have the greatest similarity to each other. Of the two, carbolic acid is better known, and is in general more easily obtained; but cresylic acid appears to possess slightly more antiseptic properties, and is at present cheaper. The commoner kinds of commercial "carbolic acid" consist, almost entirely, of cresylic acid.

If carbolic or cresylic acid cannot be obtained, chloride of lime may be used, in the proportion of one pound to a pailful of water.

Where chloride of lime is used, neither carbolic acid nor fumigation with sulphur can be employed with advantage; but chloride of lime, although very valuable where carbolic acid and sulphur cannot be used, is decidedly inferior to the combination of carbolic acid and sulphurous fumigation.

* Owing to its antiseptic properties, the addition of carbolic acid to the lime is strongly urged in all cases where it is suspected that putrefaction has commenced.

Recommendations for Disinfection.

should thoroughly brush their clothes, sprinkle or sponge them with the same solution, and expose them to the air. In addition to these precautions, inspectors will follow the directions already issued to them.

All persons who have been in contact with, or near to diseased animals, must also use similar precautions.

All clothes and baskets used for meat should be steamed, or plunged into boiling water, after being used.

7. *Further disinfecting Measures which may be used in infected or endangered Farms.*

Wash the cattle all over with a mixture of one pound of soft soap, a wine-glassful of carbolic acid, and a gallon of warm water.

This should not only be done when cattle have been near infected stock, but also when disease is in the neighbourhood. In the latter case it may advantageously be done twice a week.

Take a paint-brush, with bristles about three inches long, and having dipped it into the undiluted carbolic acid well sprinkle the liquid over the floors of the cattle sheds, the lower parts of the walls, and the droppings of the animals, every day.

Be very particular to have the farm buildings always smelling of carbolic acid, especially those sheds containing sick beasts.

No care need be taken to prevent the cattle licking the carbolic acid, as it is likely to do good rather than harm.

All clothing, baskets, cloths, tools, and utensils of any description may readily be disinfected by exposing them to the action of burning sulpher in a shed whilst undergoing fumigation as directed in section 1.

It must especially be borne in mind that disinfectants are of little use where cleanliness is not observed. The former must never be considered a substitute for the latter.

APPENDIX C.

Miscellaneous Papers and Correspondence.

I. Miscellaneous Papers relating to the Disease.

Miscellaneous Papers and Correspondence.

a. Papers presented to the Commissioners by T. Moffat, Esq., M.D., Hawarden, Flintshire.

1. Summary of Observations on the Cattle Plague, with Illustrative Map.

2. On Ozone as a Disinfectant.

1. *Summary of Observations on the Cattle Plague.*

The observations, of which the following is a summary, were made during the months of October, November, and December 1865, and part of January 1866. The district in which they were made is an area of about six miles radius, and it is represented on the accompanying map.

In the first week of October I received intimation that the Cattle Plague had appeared in the neighbourhood of Wrexham about the third week of September.

In the week ending the 18th of November it made its appearance in three stocks in the above district, each about six miles from the Wrexham centre, and about three miles from each other. The farms are represented on the map by the figures 1, 2, and 3. No. 1 is on the highway from Wrexham to Queensferry by way of Hope. No. 2 is on the highway from Rosset railway station through Kinnerton to Buckley and its neighbourhood, and No. 3 is on the highway from Wrexham to Chester. The Rosset station is on the same highway. From these three centres Cattle Plague spread over the district. The dots on the map represent the localities and number of stocks infected from each centre, and the arrows show the course the contagion followed. The numbers from 3 to 19 are sub-centres at a distance from the primary centres, but they no doubt had their origin from them.

From centre No. 1 four stocks were infected by the 29th of December. From centre No. 2 the seeds of disease were scattered to parts on a line of road forming a semicircle of upwards of fifteen miles, and the points of infection still increase in number (January 10); and centre No. 3 was also the source of much disease.

From the great death-wave which is passing over this country from east to west at a mean rate of two miles in a week there proceed off-shoots or out-posts from which disease proceeds in all directions, causing a general inundation of death. It is by observing the progress of these off-shoots or out-posts that we shall be able to discover the mode of distribution of poison germs, and the propagation of disease.

From centre No. 1, following the black arrows, we observe that the Plague proceeded along the highway to Old Hope road.

From No. 2 cattle were driven in the last week of November along the highway through Kinnerton Green to Grange Farm, where they turned to the right, and passed along through Lower Kinnerton by the Gorstilla to Chester. By following the yellow arrows on the map which represent the course and progress of Cattle Plague it will be observed that there is no disease to the left of Grange Farm, and that to the right it takes the course of the cattle from the diseased stock. Going along the road to the left of Grange Farm towards Kinnerton Lodge, and along Leicester Lane, there is a stock of cattle at a farm represented on the map by a large yellow dot at Crab Mill. This farm and stock belong to the owner of that at Honkley (No. 2 centre). As I do not know the date on which disease appeared at that place I have not numbered it. I have no doubt, however, that disease was carried from it to No. 6, as the owner of the latter informs me that cattle were driven occasionally along the road past his house after dark, and the well at which his cows were watered is upon that road. From No. 6 the highway to Chester is to the right, and that to Buckley is to the left hand; and there is a footpath from it (a much frequented thoroughfare) to the Park Farm, No. 13.

Following the yellow arrows, we trace the disease to (Lane-end village) Buckley. Buckley is a brick and tile manufacturing district, and it is also a coal district. In the village there are six butchers. The chief lines of traffic from this district are towards that part of the country lying between Wrexham and Chester on the Pulford and Rosset road, and to the district between Mold, Northop, Flint, Connah's Quay, and Queensferry. From Buckley (9), following the arrows, we perceive that disease pursues its course to Kelsterton and Connah's Quay, where it has been very fatal; and about the 30th of December the first case occurred near Queensferry. To the right hand from No. 6 the disease proceeded slowly towards Chester, and reached D. Sheen's farm (Broughton) on the 30th December. Here it appears to be stationary. From centre No. 3 the Plague, as is shown by the green arrows, proceeded onwards to Eaton and Eccleston.

Cattle Plague at times appears at places where it is difficult to account for its origin. Its appearance at Well House Farm, on the Broughton road to Chester, could not be traced to any centre or source of contagion. I have no doubt now, however, that the contagion was derived from the cowhouse of a pig dealer in Bretton. I have seen new centres of disease spring up at the houses of carriers and carters, who, no doubt, carry the seeds of disease from other parts. Pig dealers are more likely to do so than carriers. The disease often passes one stock and attacks another at a greater distance from a centre, but it invariably returns, as it were, to the one passed. This passing is only apparent. It is owing to one stock being more predisposed to the disease than the other; that is, the one attacked has less power of resistance to the poison than the one that apparently escaped it. This period of resistance is the stage of incubation. This stage varies in length according to the condition of the animal. Animals in good condition

resist the longest, but if they become diseased the disease runs its course more rapidly in these than in animals of lower condition.

Stocks at a distance from highways and thoroughfares are often unaffected, while those near to highways are diseased. The contagion passes from one stock to another through the medium of the atmosphere, rather by the process of diffusion than by atmospheric current. In proof of this I may state that between centre No. 2 and the village of Dodleston there are meadows upon which there are cottages with cows, and in the autumn months cattle graze upon them. Contagion, if carried by aerial current, would have affected these cows and cattle, and would have reached Dodleston sooner than any other stock or place. From the 18th November to the 23rd of December there were frequent south-westerly gales, yet cattle disease did not appear at these cottages nor at Dodleston until the last week in December and the first week in January. A current of air, however, I may remark, from south-westerly points of the compass, carries with it the maximum quantity of nature's disinfectant.

From personal experience and observation I came to the conclusion long ago that to save our cattle we must trust rather to prevention by disinfecting than to medicine, and I advised the farmers to use precautionary and preventive measures. To those who were desirous of trying the mode of disinfecting I proposed, I gave the following directions in writing:

Clean the cowhouses and cattle sheds thoroughly night and morning, and remove the droppings during the day. After cleaning, wash them well with a solution of common washing soda in water; add one pound of chloride of lime to eight gallons of water, and sprinkle the mixture freely several times daily behind the cows and cattle. Sprinkle Condy's Disinfecting Fluid (properly diluted according to the directions on the bottle) freely on the floors and walls of the houses by the heads of the cattle. Place pieces of phosphorus upon the corks which float on the water in the jars (quart jars filled three parts with water), and place the jars on shelves in the houses or sheds, or suspend them by wires at proper distances according to the number of cattle. If the pieces of cork become water-logged, remove them, and dry them while other pieces are in their places. The temperature of the water in the jars ought not to be under 45° of Fahrenheit, say about 50°. The temperature of luminosity varies with atmospheric pressure. Examine the phosphorus in *the lark*, and if it be not luminous, add one, two, or more table-spoonfuls of warm water to that in the jars, until the phosphorus becomes luminous. Place a test paper marked O (ozone) in *a dark place* in the house or shed, and also one marked S. H. (sulphuretted hydrogen). If they become coloured, remove them, and put others in their places. As phosphorus ignites at a low temperature, it is necessary to be very careful with it.

My object in using phosphorus as a disinfectant is the formation of artificial ozone. Ozone diffused in a gaseous form in cowhouses and sheds not only disinfects them, that is, removes substances from the atmosphere, which, by their continued action, prevent the proper oxidation of animal tissues, and thereby produce a predisposition to the action of special poisons, but also by its introduction into the blood through the lungs readily oxidises the effete matter produced by destructive assimilation, or the process of renovation of tissues. The objections to the use of phosphorus are its easy ignition, and the deleterious effects of its vapours. With regard to the former, I may state that phosphorus has been in use for four months in cowhouses and cattle-sheds, and no accident has yet occurred; and as to the latter objection, I have for five years had one piece (sometimes three pieces) in constant action in my laboratory, and I have not experienced any bad effects from it. Ozone, however, can be produced by the action of diluted sulphuric acid (or any diluted acid) upon the permanganate of potash. I have used it, but the process is much more expensive than the other, and the cheaper mode suited me better for experimental purposes. I have used the acid and permanganate in the following quantities, viz.: strong sulphuric acid, one part; water, nine parts. Pour three ounces of the diluted acid upon one ounce of permanganate of potash. The quantities to be used in disinfecting a stock must be determined according to the size of the cowhouse and the number of cattle. If my test papers be coloured 1 of my ozone scale, there will be more ozone formed than what is consumed, and if my test paper be coloured no more than 10 of my scale in 24 hours, it will not be formed in deleterious quantity. Smaller quantities at distances in a cowhouse would suit better than a large quantity at one place.

The positions of the stocks which are under the influence of the above process of disinfecting are marked upon the map with red ink, and they are numbered as they succeeded each other in being put under it. They are sixteen in number, and, with two exceptions, they are still free from disease. The exceptions are Nos. 1 and 3. At farm No. 1 the disease appeared at the same time in an adjoining cowhouse which was but partially disinfected. The cattle at this cowhouse were in the fields during the day, and disease was at the next farm to them. The owner of No. 1 is under the impression that the contagion was carried directly to his stock from another that was diseased. At farm No. 3 the animal which was first seized was not under the process of disinfecting, and while it was ill it was separated from the others, but only by an imperfect partition of boards. Two cattle that stood with their heads to her were the next that were taken ill. I merely state the facts. All the other disinfected stocks were healthy up to the 12th instant, although they are surrounded by diseased stocks. No. 2 (at Coppa) has been surrounded for weeks, and the 13th cow of a stock next to it died on the 12th. No. 5 I put under the process of disinfecting on the 15th of December. Within the distance of a mile from it, 45 cattle died at one farm from the 5th to the 15th December, and the disease was gradually approaching it. On the 12th of January I cannot say that there was a healthy stock within the area of a mile's radius of it. At the two farms nearest to it all the cattle had died off. Within a quarter of a mile of the disinfected stocks in Moor Lane, Nos. 6, 7, 8, and 9, one stock of 15 cattle has been swept away, and there is another near to them dying off. At No. 6 the young stocks in the field were diseased, and they lay under a shed adjoining the disinfected cowhouse; the cows are still healthy. At No. 15 the young stock have been ill and dying for three weeks; they are in sheds in the yard. The cows are under the process of disinfecting; they are still healthy.

How much longer these stocks will resist a contagion which has hitherto been irresistible it is impossible to say. We must not expect perfect immunity. If we find that the process of disinfecting gives to the animals a degree of resistance to the poison, it is something gained.

In conclusion, I have to state that the Cattle Plague is eminently contagious, that the poison germs proceed from a centre of contagion in a direct ratio to the amount of traffic from that centre to other parts; that the atmosphere is a medium of communication, but that the process by which the poison is communicated is rather by simple diffusion than by aerial current. That the area in which the mode of disinfecting has been tried is too small, the prevention of intercourse between diseased and healthy stocks having been utterly impossible; and it is my opinion that if a large tract of country, such as a county, were placed under a rigid system of internal quarantine, and a similar, if not the same, mode of disinfecting were carefully carried out, it would be saved the scourge of the Cattle Plague.

Hawarden,
January 16th, 1866.

T. MOFFAT.

2. On Ozone as a Disinfectant.

For upwards of 17 years I have given unremitting attention to the investigation of ozone in its meteorological and medico-meteorological aspects; and for six years I have used it, artificially formed, as a disinfectant. It is the most powerful oxidizing agent known.

From experiments, and the observation of 14 years, I arrived at the following conclusions and deduced the following results:—

Ozone destroys sulphuretted hydrogen; it rapidly oxidizes all oxidable substances disengaged during putrefaction and combustion, and it is itself destroyed by destroying these substances. It exists in the atmosphere, but in quantities varying with those of the emanations produced by the above processes. Ozone is deficient in towns and all crowded places, and near cesspools; and it is absent in inhabited houses, unless well ventilated, and it is at a minimum in cowhouses and cattle sheds even where the most scrupulous cleanliness is observed. The quantity of ozone is greater at the seashore than at inland places, owing to the atmosphere upon the sea being free from the products of putrefaction and combustion, and it increases with the elevation, the air in the higher strata being uncontaminated with these products. The quantity also varies with atmospheric pressure, temperature, and humidity, and the direction of the wind. The minimum occurs with the conditions of the north (polar) or land current of the atmosphere, and the maximum takes place with those of the south (equatorial) or sea current.

The source of atmospheric ozone is not yet understood. Electric storms were at one time supposed to be the means of production; and again, it was conceived to be produced in the upper currents of the air. From my own experiments and observations, I consider that ozone is connected with phosphorescence and that it is generated by phosphorous oxidation. I am led to this belief by the following facts: Ozone is produced by the catalytic action of phosphorus on moist air, but only when the phosphorus is luminous.

In the atmosphere there are ozone periods and non-ozone periods, and ozone and luminous periods of phosphorus occur together and under the same atmospheric conditions; and non-ozone periods and non-luminous periods take place together and under the same atmospheric conditions, that is, periods of ozone and the luminosity of phosphorus occur with the south or equatorial (sea) wind, and periods of non-ozone and non-luminosity of phosphorus take place with the prevalence of the north or polar (land) wind.

In a medico-meteorological sense, the observations afford the following deductions. The polar or land current is that of non-ozone non-luminosity of phosphorus and the maximum of deaths; and the equatorial or sea current is that of maximum of ozone and luminosity of phosphorus and minimum of deaths. The calm is also a non-ozone and non-luminous period, and it is the epidemic condition of the atmosphere. I have stated that ozone increases in quantity with the elevation; and the medico-meteorological observations show that the number of deaths diminish with the elevation, that is, the lower strata of the atmosphere afford the minimum of ozone and the maximum of deaths, and the upper strata give the maximum of ozone and the minimum of deaths.

I observed that cholera disappeared in 1848, 1853, and 1854, on the setting in of the ozoniferous current of the atmosphere. Ozone was absent or at a minimum during the epidemics.

When cholera is epidemic, the air is stagnant or calm, and there is no ozone, and cholera disappears on the setting in of the equatorial or ozoniferous current.

These results are fully verified in the "Report on the Registration of Ozone in the Bombay Presidency for the years 1863 and 1864," in which it is stated there is a decided connection between the absence of ozone and the presence of cholera; and that the number of cases of intermittent fever was decidedly less when the amount of ozone was greatest.

From the foregoing results then, it appears that ozone oxidizes miasmatic and malarious gases disengaged from putrefying animal and vegetable substances, and removes those products of decomposition which produce a predisposition to the action of special poisons by converting them into innocuous matters. Where there is no ozone, death prevails; where there is ozone epidemics disappear, and the atmosphere is purified and is salubrious. It may be said that,—

Chemically, ozone is a highly oxidized body and that it readily oxidizes all oxidable substances.

Meteorologically, ozone in the atmosphere varies with the quantity of oxidable substances, its minimum occurring with the north or land wind, and its maximum with the south or sea wind.

Medico-meteorologically, ozone removes from the atmosphere those substances which by their continued action upon the system, produce a predisposition to the action of special poisons.

Physiologically, ozone, by affording oxygen to effete matter, the products of destructive assimilation, it invigorates the animal economy and gives resistance to the action of these poisons.

From these results, which from long experience I believe to be reliable, and from the fact, as I have before remarked, that ozone is as a rule absent in cow and cattle houses, I was induced to try ozone artificially produced as a disinfectant in Cattle Plague, and since October 1865 I have had in all 22 stocks under the influence of ozone, generated by the action of phosphorus upon the air. The results of the experiments are given in the following tables compared with those of stocks that were not disinfected. The stocks on which the observations were made, amount in all to 267, and they consisted of 2,783 animals. By stock is meant any number of cattle from one cow or bullock upwards.

TABLE I.

Showing the Per-centage, &c., of Stocks that were not disinfected, and of those that were disinfected.

Not disinfected.				Disinfected.			
No. of Stocks.	Diseased.	Not diseased.	Mean No. of Cattle that have died weekly.	No. of Stocks.	Diseased.	Not diseased.	Mean No. of Cattle that have died weekly.
245	127	118	—	22	6	16	—
Per cent.	51·8	48·2	11.3	—	27·2	74·5	9·0

TABLE II.

Showing the Per-centages of Cattle diseased, &c., that were not disinfected, and were disinfected.

	No. of Cattle.	Diseased.	Dead.	Recovered.	Under treatment.	Sold or slaughtered
Not disinfected -	2,420	1,698	1,376	60	262	52
Per cent. - - -	—	70·1	56·8	2·3	10·8	2·6
Disinfected - -	363	148	123	7	18	29
Per cent. - - -	—	40·0	33·3	2·0	4·9	7·9

From these tables it appears that there are fewer cases of disease in the disinfected cattle than in those that are not disinfected; and that the plague is less rapidly fatal in the former than in the latter.

I have seen three stocks, consisting of 26, 23, and 22 cows each, die off in 13 days, while a disinfected stock of 23 cows (diseased), about half a mile from thence, were not carried off in seven weeks.

The immunity of cattle housed together in small numbers is remarkable. And among them disease is not so fatal.

TABLE III.

Showing the Per-centages of Cattle diseased, &c., in Houses containing less than Four Animals.

No. of Cattle.	Diseased.	Dead.	Recovered.	Under treatment.	Sold or slaughtered.
273	89	65	9	15	0
Per cent.	32·6	23·8	3·3	5·4	0

This immunity I attribute to isolation.

Cattle out of doors or in fields are not so liable to become diseased as those that are in houses.

TABLE IV.

Showing the Per-centages of Cattle diseased, &c., in Fields.

No. of Cattle.	Diseased.	Dead.	Recovered.	Under treatment.	Sold or slaughtered.
159	16	13	2	1	3
Per cent.	10·0	8·1	1·2	0·6	1·8

Thirty-eight of the 159 cattle are out in the fields night and day; the others are out from two to four or five hours in the day only.

The practical hints to be drawn from these results are, that houses containing cattle ought to be disinfected by ozonized air, that they ought not to contain more than three or four cattle, and that they (the houses) ought to be a considerable distance (say 200 yards) from each other, and when practicable, cattle ought to be in fields, but only in small numbers.

T. MOFFAT.

Hawarden, February 24th, 1866.

The subjoined observations, by Dr. Angus Smith, have reference to the foregoing Paper.

Dr. Moffat's general observations on ozone are, I doubt not, correct; and his experience has been great.

I still think that ozone, as it is generally found, is unequal to the task of complete disinfection in bad cases.

Dr. Moffat's experiments prove it to be unequal, although to do some good service as he prepares it.

Dr Moffat uses phosphorus vapour as well as ozone.

I still think it dangerous to use it, for the reasons given in my report.

It is probable that, by using more of this vapour, more disinfection would take place, but the after-effect of the phosphorus we cannot tell, except that it does not promise to be for good, especially on the persons employed.

Disinfection ought to be carried much farther than it is usually; people play with it, and then blame it. The use of phosphorus, to a great extent, cannot be undertaken; it is probable that fires would destroy many of our cow-houses—an additional objection.

For these reasons I cannot see that it would be right to advise the use of phosphorus.

It will be observed that I do not look on the experiments as having been made with pure ozone. That substance separated from phosphorus would have a much weaker disinfecting power, although no after-danger.

Nevertheless, Dr. Moffat's experiments are extremely interesting, and the paper a trustworthy record of this mode of treatment.

When infection comes near I am inclined to consider cattle safer in a well disinfected house than out of doors. If the house is not well disinfected they must be safer out of doors, as Dr. Moffat found.

March 16, 1866. R. ANGUS SMITH.

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b. OBSERVATIONS on the Cattle Plague by Veterinary-Surgeon Thomas Walton Mayer, Royal Engineer Train, made during his inspection of the trial of the Homœopathic Treatment in Norfolk.

SIR, Jan. 22, 1866.

IN conformity with the intention expressed in my communication of the 1st instant, I have the honour to submit the following report for the consideration of the Cattle Plague Commissioners.

During the course of my observations in Norfolk, I became exceedingly anxious to ascertain the earliest symptoms of Cattle Plague, and which could be confidently relied upon in giving an opinion as to the condition of the animals so affected.

By the liberality of the Norfolk Cattle Plague Association, I have been enabled to obtain this desirable object.

On the 21st ult., in company with Mr. Smith, the Veterinary Surgeon, Mr. Forrester, the Secretary to the Medical Committee of the Norfolk Cattle Plague Association, and Mr. Whitwell, Veterinary Surgeon, the Inspector, we visited the Potash Farm, occupied by Mr. Ellis, and found several animals infected with Cattle Plague. Out of a lot of young stock we selected a red heifer, which the owner said had not shown any appearance of sickness, but which on careful examination we agreed was affected with the disease, from the following symptoms: anxious countenance, ears turned backwards, coat staring, pulse 96, respiration 60 and suppressed, inner part of alæ nasi swollen, slight discharge from nose, no flush on gums or buccal membrane, vagina red and streaky. The mercury in a common thermometer placed in the mouth rose to about 104, and would probably gone up higher if the instrument could have been longer retained; it reached 100 in the vagina when only placed in immediately death ensued. Animal feeding and ruminating, killed by dividing the spinal cord.

Post-mortem appearances:—

Brain.—All the blood vessels and plexus choroides generally congested; cineritious substance of a yellow or cheesy colour.

Trachea.—Capillary vessels congested on surface; also mucous glands on its internal lining.

Heart.—Capillary vessels congested throughout.

Lungs.—Normal.

Stomachs.—Rumen, reticulum, and omasum contained large portions of undigested food.

Abomasum.—Blood vessels under mucous lining congested in spots or patches, its general appearance presenting the usual features of the disease, but in a modified form.

Spleen.—Surface mottled; vessels congested, and its structure softened.

Liver.—Congested, and portions exhibiting dark-coloured spots, extending into its structure.

Kidneys.—Normal.

Rectum presented the usual congested and hæmorrhoidal appearance.

Vagina.—Slightly congested, and streaked in places.

The condition of the internal organs in this heifer being clearly connected with the symptoms recorded, confirmed our opinion that this was a case of Cattle Plague in its early stages, and enabled me with confidence to divide the appearances (usually in this disease presented to our notice) into the four different periods enumerated in my letter of the 1st instant.

Another object of my inquiry that presented itself was, if possible, to ascertain the true character of the disease.

Soon after my arrival at Norwich I received information from various sources that the tanners observed that all partially tanned hides exhibited a peculiar appearance, such as was presented in the specimen forwarded to you. But it was not until the 8th of December, when I visited Mr. Gooch, Veterinary Surgeon, Reepham, and made a post mortem of a sheep affected with the Plague, that an opportunity of seeing any portion of the hides thus diseased was afforded, although I had seen the eruption on the living animal. The impression produced in my mind I communicated to you in my letter of the 9th ult.

It is desirable to direct the attention of the Commissioners to the fact, that the hides which had been purchased by the tanners could (in consequenceof the Orders in Council) only have been procured from animals slaughtered in the first stage of the disease—but which, according to my table, and in point of fact, was the third—when the eruption was completely thrown out, and on the point of subsiding. To this eruption I have used the term vesicular, because it is applied to "a small bladder or elevation of "the cuticle, containing a clear watery fluid." I have never observed it assume the pustular form except in the fourth or last stage of the disease, and then it appears raised like the encrustations on a shell

I understand some doubts have been entertained as to the correctness of this observation; of its truth I am convinced. The reason they are not generally observed is, that they appear before the animal is supposed to be unwell, that on the nose they are burst almost as soon as produced, and that a low type of the disease often prevents their being developed at all. From this latter fact I have been inclined to believe that the real character of the disease is suppressed.

In many places surrounding Norwich various attempts have been made to treat the disease, but without any general success. Veterinary Surgeon Wells (already known to the Commissioners) informs me, "that in all I have "seen I can enumerate only 12 cases of recovery, and "these were subject to various modes of treatment; the "majority however, if benefited at all by medicine, were "by the chlorate of potash, combined with sulphur and "vegetable tonics. It may be remarked, that these 12 "cases were virulent ones, and there has not been a relapse "in any."

The treatment of Mr. Major, of Park Lane, London, on the farm of Col. Fitzroy, of Stratton Strawless, was a total failure.

Veterinary Surgeon Sayer, St. Giles Street, Norwich, successfully treated several animals on the farm of Mr. Jary, of Spixworth. Three of the budds on this farm, and alluded to in Professor Varnell's report, have been cured.

Miscellaneous Papers and Correspondence.

During the last fortnight of my stay in Norwich I had the opportunity of seeing the treatment of some young stock belonging to C. S. Read, Esq., M.P., and kindly placed by him at the disposal of the Norwich Medical Committee. This experiment was undertaken in order to ascertain if it was possible, by counter-irritation, &c., to induce the system to throw out the disease in a more decided form.

On visiting the farm with Mr. Smith, Veterinary Surgeon to the Norfolk Cattle Plague Association, we found one young animal very ill from the disease, and out of eight others several that had evidently taken the infection.

The whole were carefully housed, placed on food consisting of bran and oilcake made moist.

Hydrarg. cum cretæ, gr. x., and pulv. ipecacuanhæ comp. gr. xx., was ordered to be given on their tongue morning and night, and this was afterwards repeated three times a day.

The cases were dressed with ung. hydrarg. fort., to which antimon. tart. was added in the proportion of a drachm to an oz., all along the spine from the shoulder to the sacrum. This created a great vesicular eruption, with a certain amount of relief, which would, I think, have been more successful had it been applied to the upper part of the trachea and adjoining parts.

The administration of medicine in a liquid form is attended with some disadvantages; it is not retained in either the first, second, or third stomach, and it is very doubtful to what extent in the fourth, unless mixed with mucilage, &c.

Whenever the stomachs are supposed to be impacted with food, I have always (with the best results) administered a portion of medicine in the solid form. In most cases, placed on the tongue, its introduction into the system is speedily secured.

As the disease advanced a tonic treatment was adopted, sulph. ferri being given in combination with cort. Peruvian. three times a day along with beer and gruel. I regret to add that no ultimate benefit was produced.

The post-mortem examinations made during my investigations have presented some important features. In two instances there was effusion of serum into the ventricles of the brain. In one, a cow that had died almost in the act of calving, similar spots presented themselves on the nose, vulva, &c. of the fœtus as in the mother, and the rectum was in a hæmorrhoidal condition.

In all the cases, the peculiar dark-coloured, congested patches were found in the heart, interior of fourth stomach, liver, and urinary bladder; the spleen was invariably found disorganised, and broken down in structure.

That other ruminants will become infected with the disease there is now no doubt. A sheep and a goat that I had the opportunity of examining both died from the Plague in its most virulent form.

From unavoidable circumstances, the experiments which were suggested by Mr. Ceely had not been commenced by the Norwich Medical Committee prior to my leaving Norfolk. They are now about to begin, and I am quite sure the Commissioners may rely on their being carefully carried out. Sincerely do I hope that they may conclude with a satisfactory result.

I have the honour to be,
Sir,
Your most obedient servant,
THOS. WALTON MAYER,
Veterinary Surgeon Royal Engineers.

Mountague Bernard, Esq.

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c. MEMORANDUM upon the Cattle Disease, by Professor Seifman, Professor of Veterinary Surgery in the University of Warsaw.

(*Transmitted by Lieut.-Colonel Mansfield.*)

The Medical Times, No. 796, contains an article, in which it is stated that Professor Simonds made the first discovery that sheep are capable of taking the so-called cattle typhus, not only conveying the contagion, but themselves being attacked by a genuine form of the disease; and also, that no such discovery has hitherto been made on the continent.

I have no doubt that Professor Simonds has made the above-mentioned discovery as far as regards England, but I must altogether protest against the statement, that we on the continent had not also made a similar discovery. Up to the year 1860 the cattle typhus was considered to be entirely confined to cattle, and this opinion was quite justified by the circumstance, that, with the exception of some isolated cases, the sheep remained remarkably free from all disease in the districts where the cattle typhus was the most prevalent.

From cases which occurred during the last five years in Bohemia, Hungary, Austria, in several governments in Russia, and more especially from what has come under my own immediate observation in Poland, I came to the conclusion that both sheep and goats are liable to take the cattle typhus. This disease in sheep is absolutely identical with the genuine cattle typhus, not only as regards its contagious qualities, but also in symptoms and pathology.

I have no hesitation in saying that up to the present time the causes of the contagion as regards sheep are most mysterious, as it has been remarked on all sides that sheep which have been in close contact with diseased cattle by no means invariably themselves contract the disease.

To give an instance of the above I may state that in the year 1863, when the cattle typhus was most prevalent, the sheep were only infected in one out of the 39 districts of the kingdom of Poland, namely, in the district of Lomza; 20 localities were infected in this district, and the number of sheep which died amounted to 4,000.

There is no doubt that with sheep the disease is by no means so destructive and fatal as with cattle; and the number of sheep which recover may be taken at an average of 20 per cent. With regard to the remedies I can give no decisive opinion, but unquestionably cleanliness of the sheepfold and plenty of ventilation are the first things to be considered, and of course sick sheep should be instantly isolated from the rest of the flock.

Great attention should be paid to the veterinary police regulations, which, if followed, do much to obviate contagion.

As soon as reports were received from Lomza of the existence of the disease among the sheep, I was sent under instructions from Government to investigate the matter, and in conjunction with the local veterinary surgeons to report the result. After receiving my report the Government issued regulations bearing a close similarity to those in force with regard to arresting the contagion among the cattle.

From the above circumstances it is perfectly clear that on the continent, and particularly in the kingdom of Poland, we were well aware that sheep were subject to the cattle typhus, and that measures had been taken by the Government so early as the year 1863.

Time and space in this short memorandum forbid my entering upon the very interesting features respecting the transmission of this malady from sheep to cattle, and vice versâ, and for such information I must refer any who are curious upon this subject to my report published by the Medical Council of the kingdom of Poland in 1863, the chief particulars of which may be found in a German book edited by Dr. M. F. Röll at Vienna in 1864, entitled "Die Rinderpest ähnliche krankheit der Schafe und Ziegen," and also in the Italian report published at Turin in 1864 under the title of "La malattia delle pecore e delle capre simigliante alla peste bovina."

I now come to a second question respecting the cattle typhus, my attention having been attracted to an article in the Medical Times headed, "The real question to be decided by the Royal Commission, &c."

The author in this article seems to me to put too much trust in the efficacy of inoculation. Experience has taught us that inoculation is of no use except with cattle of the breed which comes from the steppes; these latter, as we well know, take the disease in a much less virulent form, and a full 50 per cent. recover; inoculation is merely of service as immediately causing the beast to sicken, and thereby hastening the chance of curing an animal by immediate treatment, but up to the present time there is certainly nothing to show that the inoculated animal takes the disease in a milder form.

I entirely concur in the opinion which prevails in England that every endeavour should be made to induce the malady to give way to treatment.

Such, therefore, being my opinion, I am wholly opposed to inoculation, which merely tends to promote contagion, and may perhaps sometimes cause a beast to sicken which might have otherwise escaped.

Warsaw,
November 1865.

II. Correspondence with Edward Hamilton, Esq., M.D., and with the Association for the Trial of Preventive and Curative Treatment in the Cattle Plague by the Homœopathic Method.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S.W.

Sir, 1 Oct. 1865.

It has been stated to this Commission that you have acquired in Holland information respecting the treatment of the Cattle Plague which you think might usefully be communicated to the Commissioners.

In that case I have to request, on the part of the Commissioners, that you will have the goodness to state to me in writing the general nature of your information, and your sources of knowledge. Considering the great number of suggestions for the treatment of the disease which are laid before the Commissioners, you will not think this request unreasonable.

I may add, that the more particular your statement is the better it will serve the purpose for which it is asked.

I am, Sir,
Your obedient Servant,
Mountague Bernard.

E. Hamilton, Esq., M.D.,
22, Grafton Street.

22, Grafton Street, Bond Street,

Sir, 6th Nov. 1865.

I beg to acknowledge the receipt of your letter of November 1st, 1865, requesting information of a general nature concerning the treatment of the Cattle Plague in Holland, but at the same time to give as particular a statement as it is in my power to afford, as well as my sources of knowledge.

My sources of knowledge are,—

1. Monsieur Loudon, the Governor of South Holland, and Royal Commissioner appointed by the King for investigating this disease, and taking measures to prevent its extension.

2. Herr C. J. Hengeveld, the President of the Commission, composed (I understand) of two physicians and three veterinary surgeons, now sitting at Schiedam.

3. Herr Vandyk, the Burgomaster of the Commune of Matternesse, in which commune all the animals affected by the disease after the 24th of September were placed under the care of M. le Professeur Gaudy, a veterinary surgeon, Member of the Royal Academy of Medicine at Brussels, assisted by M. Seutin, a chemist, who treated them as I shall hereafter describe.

4. From MM. Gaudy and Seutin themselves, and from Dr. Mouremans, a physician at Brussels, with whom the above-named gentlemen were in correspondence and consultation during the treatment.

First, then, from the Governor of the province, Mr. Loudon, I received the following account of the origin of the disease, and the history of its outbreak in Holland.

That it had been distinctly traced to a herd of cattle, 23 in number, which had been exported from Rotterdam, and sent back unsold from the Islington Market, where they had remained upwards of a fortnight. The whole of these cattle were sold to a farmer of Kethel, a few miles from Rotterdam; 17 of them were placed in a cowshed, and the remaining six in an adjoining meadow. They were all attacked by the disease, which, from this centre, spread in all directions.

That immediately on the Government being made aware of the presence of this disease, a cordon sanitaire was drawn round the infected districts, including an area comprising a considerable distance from the actual seat of the outbreak.

This cordon extends from Katwyk-on-the-Sea, by Leyden, Gouda, Schoonhoven, Ottoland, Dorddrecht, across the Hollands Diep by Wiliemstad, between the islands of Overflakke and Schoonoven, again to the sea. The cordon includes the exporting market of Rotterdam. The export of cattle from the infected districts continues viâ Rotterdam.

That within that cordon, up to the week ending October 21st, 5,420 horned cattle had been attacked, whilst only two or three cases had occurred outside that cordon.

That the panic which had seized the farmers and peasants at the outbreak had subsided since the publication of the reports, and that the disease was found to be amenable to treatment.

That the propagation of the disease had not, up to that time, been affected by any atmospheric conditions.

The spread of the disease seems to have been arrested—

By the strict maintenance of the cordon, which became a stringent military one on the 24th of October;

By killing all fat cattle fit for the markets suspected to have been in contact with affected animals, or by exportation viâ Rotterdam;

By judicious medical and hygienic treatment of the remainder;

By preventing the entrance from other parts of Holland, and the importation of all horned cattle into the affected districts.

Second.—From Herr Hengeveld, and other members of the Cattle Plague Commission, I received the following statement of the opinions they had formed:—

That the disease is of a highly contagious nature; that it can be conveyed by almost any article which has been in contact with diseased animals.

That it was necessary to take measures to disinfect, as far as possible, all persons moving from one district to another visiting diseased cattle. The usual method employed was a solution of carbolic (phenic) acid.

That the symptoms of the disease and post-mortem appearances as they appeared in the rinder typhus in Holland were similar to those described as occurring in England.

That the disease was amenable to treatment.

That they considered the remedies which had been most beneficial, according to the usual mode of treatment, were—

1. Dilute muriatic acid in one drachm to one and a half drachm doses in linseed tea, often repeated; as much as six drachms might be given in the 24 hours.

2. Dilute sulphuric acid, with quinine, gentian, ginger, tormentilla, and other astringents and tonics.

3. A careful hygienic treatment, to which they attach much importance.

A preparation composed of 10 drachms of carbolic (phenic) acid to 40 quarts of water had been found very beneficial in washing the eyes, nose, mouth, vagina and rectum, of the cattle affected.

This same preparation was also used extensively as a prophylactic remedy, being applied externally, but as yet no account had been received of the number so treated.

The disinfectants employed in the cowsheds and elsewhere were coal tar (kool tur), carbolic (phenic) acid, and chloride of lime.

The preparations of chlorine used for fumigating the sheds, to be employed with great caution; they were found to be injurious, often inducing an affection of the lungs, which was apt to destroy those cattle which had become convalescent from the rinder typhus.

The grains and distillers' wash ought to be avoided as articles of food, as predisposing the healthy to attacks, and injurious to those suffering from the disease.

The use of stimulants had been quite unsuccessful.

Inoculation had been employed as a mode of treatment, but had entirely failed.

Other animals, as sheep and goats, had been inoculated with the virus, and took the disease, but it had only spread amongst horned cattle.

Forty-five (45) per cent. of recoveries was the result of the treatment of the total number of affected cattle up to the 21st of October.

Having inquired of Monsieur Loudon, before quitting the Hague, as to the report that the homœopathic treatment of the Cattle Plague had been attended with success; he replied that it had, but how far he was unable to say. I received from him a letter to Herr Vandyk, the burgomaster of the commune in which the experiments were made. I also inquired of M. Hengeveld, the President of the Commission, if he could give me any information on this head. He replied that he had heard the report, but declined to enter into the question, referring me to Herr Vandyk, from whom I learnt that two Belgian gentlemen, Professor Gaudy and Monsieur Seutin (already mentioned), having volunteered their services to the Dutch Government to treat the disease with homœopathic remedies, the commune under his authority was assigned to them for their experiments. These he informed me he watched closely.

That from the 24th of September to the 20th of October 80 horned cattle were treated by them; 60 were cured and 20 died.

That 230 beasts had been put under the homœopathic preventive treatment, hereafter to be described. Out of that number, up to 26th October, 25 had taken the disease.

The chief remedies employed, according to the indications that presented themselves, were the homœopathic preparations of arsenic, rhus toxicodendron, phosphorus, phosphoric acid, and sulphur.

Other homœopathic preparations were employed to meet the different indications which occurred in the develop-

ment and convalescence of the disease, as aconite, belladonna, kreosote, nitric acid, nux vomica, digitalis, sulphuric acid, thuya occidentalis, veratrum album, &c.

That the prophylactic (preventive) treatment consisted of the internal administration of the homœopathic preparations of arsenic and rhus toxicodendron.

A mixture of the homœopathic preparation of arsenic with water was also employed, in some cases, to wash the mouth, nose, and eyes.

The diet in the acute stage was linseed and other farinacious gruels.

In the convalescent, hay and green food sparingly given.

It will be seen by the foregoing statements that the amount saved under the various treatments amounted to 45 per cent.

Under the exclusive use of the preparations of homœopathic medicines an amount at the rate of 75 per cent. recovered.

In conclusion I may remark, that on my arrival at Brussels I had interviews with Professor Gaudy and M. Seutin, as well as with Dr. Mouremans, who was in consultation with the above-named gentlemen during the homœopathic treatment at Matternesse, and had all the information communicated to me by M. Vandyk entirely confirmed.

I beg leave to add, that (as the President of the Commission, Earl Spencer, was informed by Dr. Quin in his letter of October 30th,) I hold myself in readiness to appear before the Commission, to give any further information or explanation, when summoned to do so.

I have, &c.
EDWARD HAMILTON, M.D.

Mountague Bernard, Esq.,
&c. &c. &c.
Secretary to the Cattle Plague Commission.

6, Adelphi Terrace,
18th Nov. 1865.

SIR,

I AM directed by the Association for the trial of preventive and curative treatment in the Cattle Plague by the homœopathic method to request that you will furnish me with an official copy of the proposals, a rough draft of which was handed to Dr. Hamilton at the meeting of the Cattle Plague Commission this afternoon, in order that these proposals may be presented to the Association in a regular form.

The Association in the meantime is not intermitting its efforts to promote the trial of the homœopathic remedies in the Cattle Plague on a very large area of observation, and with this view plain directions, with forms for recording results, have been prepared for the use of farmers and others who may be willing to test the efficacy or otherwise of the homœopathic medicines.

I am, Sir,
Your obedient Servant,
R. BUCHAN,
Secretary.

The Secretary of the
Cattle Plague Commission.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10),
Westminster, S. W.,
22d November, 1865.

SIR,

I HAVE to acknowledge the receipt of your letter dated the 18th instant (but which was delivered here yesterday), in which you request, on the part of the Association for the trial of preventive and curative treatment in the Cattle Plague by the homœopathic method, to be furnished with an official copy of the proposals, a draft of which was handed to Dr. Hamilton on the 18th, in order that these proposals may be presented to the association in a regular form.

By the direction of the Commissioners I enclose an extract from their minutes embodying the substance of the proposal which was placed in Dr. Hamilton's hands.

The Commissioners are very desirous, as I told Dr. Hamilton on the 8th November, when at my request he did me the favour to call upon me, that a fair and thorough trial should be made, under competent inspection, of the method of treatment which has been practised by Messrs. Seutin and Gaudy at Mathenesse in Holland.

They think it desirable that the trial should include cases of disease produced both by inoculation and by natural infection.

The scheme enclosed has been framed with a view to inoculated cases, and is in their opinion a perfectly fair one.

With respect to natural cases, I understood from Dr. Hamilton that the gentlemen with whom he was acting were in correspondence with stock owners in various parts of the country, and hoped soon to be able to institute experiments open to competent inspection, on the extensive scale which they deemed desirable. It appears from your letter that the Association are prosecuting their endeavours for this purpose, and I am directed to say that the Commissioners will most willingly consider any plan of the kind which the association may lay before them.

The Commissioners have been informed that some experiments of homœopathic treatment have been already commenced in the county of Norfolk, and are now in progress there. They have accordingly instructed Veterinary Surgeon T. Walton Mayer, of the Royal Engineer Train, a practitioner of skill and experience in the diseases of cattle, to proceed immediately to Norwich, in order to watch and report upon these experiments; and they trust that all reasonable facilities will be given him for the thorough and satisfactory performance of the duty with which he is intrusted.

I am, Sir,
Your obedient Servant,
MOUNTAGUE BERNARD.

R. Buchan, Esq.

(Enclosure in preceding Letter.)

"That four animals shall be inoculated at the same time with the same matter by Dr. Sanderson; that of these the homœopathic veterinary surgeon shall have the choice of two, of which he shall have entire control at Dr. Sanderson's; that he shall have the choice of stalls, clothing, and food, and his own man to attend the animals.

"That he shall commence the treatment of one animal as soon as he pleases, writing prescriptions for double the quantity of medicine he requires from the homœopathic chemist; half of each dose to be given to the animal; the other half to be kept by Dr. Sanderson labelled for analysis, if it should seem desirable that an analysis should be made. No medicine to be given without a prescription, wkich shall be kept.

"That the veterinary surgeon shall write out full notes of the cases for the Commission; and that Dr. Sanderson shall also write out full notes of the symptoms and treatment. The notes of Dr. Sanderson to be open to the veterinary surgeon, if it should be wished or desired.

"That the other animal shall be treated first when Dr. Sanderson pronounces that it has the disease. No medicine to be given without a prescription for double the quantity; half to be kept by Dr. Sanderson.

"That in case of death Dr. Bristowe shall make the post-mortem examination.

"These experiments to be repeated not less than thrice, and more often if desired."

6, Adelphi Terrace, W.C.,
28th November 1865.

SIR,

I HAVE the honour to acquaint you for the information of the Cattle Plague Commission, and for such directions as they may see fit to give to Mr. Mayer, their Inspecting Officer in Norfolk, that at a meeting last evening of the committee of the Association it was determined to commence a series of experiments of the preventive and curative treatment of the Cattle Plague by the homœopathic method by Mr. James Moore, M.R.C.V.S., and two assistants, under the direction of Lord Bury, who has kindly undertaken to act as the representative of the Association on the spot.

Mr. Moore will begin his treatment on Thursday next the 30th instant, and he has entered into an engagement to give his entire time and attention to this work for one month, and to prepare statements of the cases to be regularly submitted to the Association.

I have further to observe, that the experiments about to be undertaken are the only ones which have the sanction of the Association, and that anything that may previously have been done in Norfolk has not been with their cognizance or under their supervision.

Mr. Moore has been instructed to give Mr. Mayer, your Inspector, every opportunity of observing his practice, and it is hoped that that gentleman may be continued in Norfolk while this trial is going on.

Your letter to me of the 24th instant, with its enclosure, has been referred to the medical section of the Association, for their consideration, and for the preparation of any counter propositions they may think it desirable to lay before the Association at its next meeting, for early submission to the Cattle Plague Commission.

I have the honour to be,
Sir,
Your obedient Servant,
R. BUCHAN, Secretary.

Mountague Bernard, Esq.
Cattle Plague Commission.

6, Adelphi Terrace,
30th November 1865.

Sir,

In reply to your letter of the 22d instant, and the accompanying Minute of the Cattle Plague Commissioners, I am directed by the Association for the trial of preventive and curative treatment of the Cattle Plague by the homœopathic method to state to you, for the information of the Commission, that the Association, having carefully considered the two proposals contained in those documents, have arrived at the following conclusions:

The first proposal, viz., that four animals shall be inoculated with the disease, two submitted to homœopathic treatment and two left to nature, they decline, because they are informed by their medical committee in the accompanying report, that there is no reason for believing that the four animals so inoculated would present the same symptoms. They are informed that the assumption that the cases would be exactly similar is entirely opposed to what has been observed of the effects of inoculation in the human subject, and that there is an immense difference between cases of inoculated small-pox excited by the same virus.

Moreover, even were the experiment likely to be satisfactory in a scientific point of view, which it is feared it would not be, it seems to the Association inexpedient to produce artificially a disease which is to be found in only too great abundance in almost all parts of England, and mproper to detain for the purpose of treating the small number of artificial cases the few veterinary surgeons acquainted with homœopathy whose services are eagerly sought for in almost every district where the plague is raging.

The second proposal, viz., that a veterinary surgeon should be sent by the Government to report on the cases treated by a homœopathic veterinary surgeon the Association agrees to, on the conditions fully stated in the accompanying report of the medical committee. The chief difficulty in the way of this plan being satisfactorily prosecuted arises from a difference of opinion between the two veterinary surgeons as to what is and what is not a case of Rinderpest. To remove this possible difficulty at the outset, it is proposed that the medical committee of the Commission should agree with the medical committee of the Association as to what are the distinctive characteristics of the disease in its various stages.

The importance of preventing the occurrence of this disagreement is proved by the enclosed report of Mr. James Moore, from which it appears that his first attempt to give a fair trial to the homœopathic method in Norfolk was entirely frustrated by the interference of two inspecting veterinary surgeons, who refused to confirm his diagnosis of the disease in various animals, which being in consequence of this refusal left untreated rapidly passed into the later stages of the disease and died.

This impediment having been removed in Norfolk, Mr. Moore commences a fair trial there for the first time to-morrow (December 1st), under the superintendence of Viscount Bury, a member of this Association, who is empowered by the Cattle Assurance Society of that county to see the treatment carried out.

Finally, as the Commission express a wish for a comparative trial of the homœopathic method, and as the one they have proposed is considered to be impracticable, the Association propose the following, the fuller details of which will be found in the accompanying report of the medical committee.

That in some district where the disease is raging 100 animals be treated by homœopathic veterinary surgeons, 100 left untreated, and 100 by the most skilful allopathic veterinary surgeons, with full inspection of all by both parties.

I have the honour to be,
Sir,
Your obedient Servant,
R. Buchan,
Secretary.

Mountague Bernard, Esq.,
&c. &c. &c.

(*Enclosure in preceding Letter.*)

Report of the Medical Section on the Communication from the Cattle Plague Commission.

Your medical committee gladly avail themselves of this opportunity of expressing their satisfaction that the Cattle Plague Commission has announced its wish that a fair and thorough trial should be made, under competent inspection, "of the homœopathic method of treating that disease." So far from desiring to interpose any obstacle in the way of effecting this object, it has been the wish of your medical committee from the first to place at the disposal of the Cattle Plague Commission whatever information they had been able to collect; and, with this view, it was notified, in a letter from Dr. Quin to Earl Spencer, President of the Commission, dated 30th October, that Dr. Hamilton was willing to lay before that body all the facts he had learned regarding the measures taken in Holland to arrest and to cure the disease by the ordinary mode of treatment, as well as the results reported to have been obtained by the application of the homœopathic method.

The proposals made by the Cattle Plague Commission, which you have referred to us, will be taken in the order in which they were made.

The first proposal; viz., that four animals shall be inoculated at the same time with the same matter by Dr. Sanderson; that of those the homœopathic veterinary surgeon shall have the choice of two, of which he shall have entire control at Dr. Sanderson's; that he shall have the choice of stalls, clothing, and food, and his own man to attend the animals.

That he shall commence the treatment of one animal as soon as he pleases, writing prescriptions for double the quantity of medicine he requires from the homœopathic chemist, half of each dose to be given to the animal, the other half to be kept by Dr. Sanderson, labelled for analysis, if it should seem desirable that an analysis should be made. No medicine to be given without a prescription, which shall be kept.

That the veterinary surgeon shall write out full notes of the cases for the Commission, and that Dr. Sanderson shall also write out full notes of the symptoms and treatment. The notes of Dr. Sanderson to be open to the veterinary surgeon, if it should be wished or desired.

That the other animal shall be treated first when Dr. Sanderson pronounces that it has the disease. No medicine to be given without a prescription for double the quantity, half to be kept by Dr. Sanderson. That in case of death Dr. Bristowe shall make the post mortem examination.

These experiments to be repeated not less than thrice, and more often, if desired.

The manifest intention of this proposed experiment is to obtain four exactly similar specimens of the disease, to submit two to homœopathic treatment, to leave two untreated, the result to be watched. The fairness of this experiment evidently depends upon the assumption that the disease produced by inoculation manifests itself in exactly the same manner and degree in every animal inoculated.

So far as our information goes, this is not the case, and inoculated animals do not present symptoms entirely uniform, either with one another or with those affected with the natural disease. So far as analogy with the human species goes, it is entirely opposed to this assumed uniformity, for if four persons be inoculated with the same virus, it is known that the small-pox may appear in its mildest form in one, with more severity in another, with still greater in a third, while in the fourth it may assume the confluent malignant and often fatal character. Indeed, the fact that, although the majority of those inoculated had small-pox in its mild and modified form, still that a considerable proportion died of the complaint thus artificially produced was a strong argument used by those who sought to substitute vaccination for the uncertain and dangerous process of inoculation. For these reasons your medical committee not only cannot recommend the acceptance of this proposal, but strongly recommend its rejection. Were there no other reasons against the proposal, the number of homœopathic veterinary surgeons is too small to allow their time to be occupied and their efforts absorbed in the treatment of cases created artificially of a disease which in its natural form is destroying the cattle in such numbers throughout the country. But even supposing, for the sake of argument, that the proposed test by inoculation was not objectionable and inadmissible in itself in a scientific or practicable point of view, the smallness of the number proposed to be inoculated would render the experiment utterly useless and inconclusive. Moreover your medical committee are of opinion that whilst so many districts are devastated by this fatal disease, killing thousands of animals, and affording a large field for the trial of different modes of treatment, and for making efforts to arrest and cure it, it would be fatal to create the disease in order to obtain cases for experiments, instead of exerting all our energies to check and cure the pest, which springs up in spite of all precautions, and ravages our farms, notwithstanding all the attempted cures hitherto made.

The second proposal is as follows: "With respect to "natural cases, I understand from Dr. Hamilton that the "gentlemen with whom he was acting were in corre- "spondence with stock owners in various parts of the

"country, I hope* soon to be able to institute experiments open to competent inspection, on the extensive scale which they deemed desirable. It appears from your letter that the association are prosecuting their endeavours for this purpose, and I am directed to say that the Commissioners will most willingly consider any plan of the kind which the association may lay before them."

The object of bringing the subject before the Commission appointed by the Privy Council, and of forming the association, was to show the possibility of the homœopathic method being of service, and not merely as an experiment to satisfy the curiosity of scientific inquiries, but with the hope, grounded on evidence, of mitigating to some extent a great national calamity; hence it would be wrong to sacrifice the primary object of the association to a less urgent although highly important consideration.

From this it follows that if the Government inspection offered any obstacle to a fair and impartial trial of any mode of treatment of the malady it is imperative that all such impediments should be removed. Such a danger occurs in this way: It is notorious that all diseases, but especially those of the miasmitic class, are less tractable the further they are advanced; that to have a fair chance for treating them successfully they must be treated in their early as well as later stages.

But the question naturally arises—

How is the first stage to be recognized? Here there is room for difference of opinion. The homœopathic veterinary surgeon may affirm an animal to be ill of Rinderpest, while the Government inspector refuses to acknowledge the symptoms to be so pronounced as to warrant his certifying to its being so. That this is no imaginary difficulty may be learned from the accompanying report sent to the medical committee of your association by Mr. James Moore, veterinary surgeon, who was invited to Norfolk by a local association to undertake the treatment of the Cattle Plague there. (See enclosed report.)

To avoid the recurrence of such unseemly disputes, your medical committee recommend the association to propose to the Commission appointed by the Privy Council to request their Medical Committe to agree with the medical section of your association as to what are the pathognomonic symptoms of the different stages of Rinderpest, and when such symptoms are present let the case be acknowledged and entered as of one disease.

Should the homœopathic veterinary surgeon declare the symptoms to be present in any animal, and the Government inspector deny that they are, or vice versâ, let the animal which forms the subject of dispute be separated and watched, and let the issue determine which of the two is right. The animal not to be killed, as has in some cases occurred. Since it is the desire of the Government Commission to have a series of comparative trials, and since the plan by inoculation has been shown by your medical committee to be inadmissible, either in a scientific or practical point of view, your Committee submit for your consideration the following proposals:—

In a district where the Plague is rife let a number of animals, at least 100, stricken with the disease in its various stages, be submitted (with the consent of or by the desire of the farmers or owners) to the homœopathic method of treatment, and as it seems to be the opinion of the Medical Committee of the Cattle Plague Commission that medical treatment should be pitted against nature, let a similar number be separated and not treated at all, and a third similar number be treated by the most skilful veterinary surgeons of the prevailing school of medicine; inspectors or veterinary surgeons on both sides to certify to the cattle in all three divisions having the disease, and let the result be carefully observed. In regard to the precautions which the Cattle Plague Commission recommended in order to prevent any possible inaccuracy relating to the medicines, your Committee beg to observe that the medicines proposed for the homœopathic treatment of the Cattle Plague are not secret preparations, but are prepared according to the formulas of a recognized pharmacopœia, which is in use in this and other countries, and if it is thought desirable there will be no objection to the preparations being made by chemists or veterinary surgeons appointed by the Cattle Plague Commission, according to the directions given in the pharmacopœia, and under the superintendence of one of your Committee. (Pharmacopœia Homœopathica F F, Quin apud Highley, 1834.)

In conclusion your medical committee have to observe that the designation of the treatment by the Cattle Plague Commission as the method of M. Gaudy and Seutin's may give rise to the misapprehension that it is a plan peculiar to these gentlemen; whereas it is the method generally known as the "homœopathic;" and it is not intended here to follow the footsteps of the Belgium veterinary surgeon and chemist whose cases have not yet been published, but to direct treatment by the law which has guided homœopathic practitioners during many years in the management of other serious diseases in both men and animals.

The object of Dr. Hamilton's visit to Holland being to ascertain how far the experiments made and making in England were corroborated by the results obtained in Holland in a commune exclusively dedicated to the treatment of the Rinderpest by homœopathy.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10.)
Westminster, S.W.
7th December 1865.

Sir,

Your letter of the 30th ultimo, with its enclosures, in reply to mine of the 18th, has been laid before Her Majesty's Commissioners.

My letter to you of the 18th contained one proposal only, which had been carefully framed with a view to secure an examination, limited indeed as regards the number of cases, but thoroughly accurate and scientific, and perfectly fair, of the effect of homœopathic treatment on infected animals. For such a trial the Commissioners proposed to provide the means, the expenses being defrayed out of the limited sum which has been placed at their disposal by the Treasury for experimental inquiries. The Association have declined this proposal. The Commissioners cannot acquiesce in the soundness of the reasons assigned for the refusal; but they abstain from engaging in a discussion which could lead to no practical result.

I was further directed to inform you that the Commissioners, understanding that the Association were endeavouring to obtain the means of instituting experiments on a more extensive scale, and open to competent inspection, would most willingly consider any plan of that kind which the Association might lay before them.

With reference to this point the Commissioners learn from Mr. Mayer, the gentleman whom they have instructed to watch and report upon the trials of homœopathic treatment in Norfolk, that considerable numbers of animals have already been placed under preventive and curative treatment respectively by homœopathic practitioners appointed by the Association; and they understand that in discriminating between actual and suspected cases no material differences of opinion have arisen between those gentlemen and Mr. Mayer. They have desired Mr. Mayer to furnish regular and accurate reports of these experiments, and they rely on his being allowed all proper facilities for that purpose. The sole object which the Commissioners have in view is to convince themselves whether, and to what extent, the homœopathic method of treatment is really effective for prevention or cure, and there appears reason to hope that the experiments now proceeding will be sufficient for this purpose. For the present, therefore, and whilst these experiments are in progress, they think it unnecessary to enter upon a consideration of the two further proposals contained in your letter.

I am, Sir,
R. Buchan, Esq. Your obedient Servant,
Mountague Bernard.

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6 Adelphi Terrace,
14th December 1865.

Sir,

The Cattle Plague Association having referred to their medical committee your letter of the 7th instant, on the subject of the proposals made by the Royal Commissioners and the Association respectively, with the view of testing the preventive and curative treatment of the Cattle Plague by the homœopathic method, I have the honour to enclose a copy of a report received from the medical committee of the Association, and I am to request that this report may be laid before the Royal Commission.

With the opinions expressed by their medical committee the Association entirely agree, and they are glad to learn from two of the members of the committee, who visited the scene of the experiments now being conducted

* An error. The words were "and hoped."

by Mr. Moore and his assistants, under the inspection of Mr. Mayer, that, agreeably to the directions of the Association, every facility is afforded the Government Inspector, so as to enable him to furnish to the Royal Commission regular and accurate reports of these experiments.

The Association are also glad to learn that, as noticed by you, no material differences of opinion have arisen between the veterinary surgeons acting under the orders of the Association and Mr. Mayer.

I have the honour to be,
Sir,
Your obedient servant,
R. Buchan,
Secretary.

Mountague Bernard, Esq.

Copy of Report of the Medical Committee of the Cattle Plague Association on the letter from the Royal Commission of the 7th December 1865.

Your medical committee regret that the Commissioners do not acquiesce in and appreciate the force of the reasoning which actuated them in recommending the Association to decline the proposal to treat homœopathically a very small number of animals, and these only inoculated ones.

In so doing your committee thought it but right and proper, as well as respectful to the Commissioners, to state their reasons for recommending the proposal to be declined.

They were influenced by similar motives in recommending the counter-proposal, viz., that of instituting experiments upon a large scale, the only course which in their opinion offers a fair means of testing the efficacy of any method of treatment, whatever it may be.

They had no wish or intention of inviting or entering into a discussion respecting the relative merits of different modes of treatment, but simply a desire to lose no time in making trials on a sufficiently large scale to obtain reliable results.

Your committee regret that the Commissioners are not in a position, from want of means, to carry out the experiments on the scale proposed.

It is fortunate, however, that the Association have been able, unaided, to commence their experiments in Norfolk and elsewhere, with such a number of infected animals as will afford means of testing the efficacy of the medicines recommended by them, or lead with increased experience to other recommendations, from time to time, according to the different indications which may arise.

Your committee learnt with great satisfaction that the Commissioners had appointed a veterinary surgeon to watch and report upon the homœopathic trials now going on in Norfolk; and it must be a matter of congratulation to the Association that the instructions they sent down the instant they were made acquainted with the mission and departure for Norfolk of Mr. Mayer, that "every "facility should be given to enable him to observe the ex- "periments," have been attended with good effects, and that in discriminating between actual and suspected cases no differences of opinion have arisen between that gentleman and the homœopathic veterinary surgeons appointed by the Association.

In conclusion, the Commissioners state that they think it unnecessary to enter upon the consideration of the two further proposals contained in the letter of the Association whilst these experiments are in progress.

Your committee have less to regret at this decision, as it gives more time to test what are at present but tentative medicines, in so novel and dire a disease, and determine, after increased experience, what modifications in diet, remedies, and treatment in the disease itself and its sequelæ are required.

These important considerations already engage the serious and earnest attention of your committee.

Before closing this report your committee are desirous of stating that, notwithstanding the considerations to which they have just alluded, they are still ready to recommend the Association to carry out the two further proposals, whenever the Commissioners may deem fit to intimate their willingness to instruct their veterinary surgeons to do their part in the treatment of a similar number of animals, according to the scale and on the plan mentioned in the counter-proposal of the Association.

(Signed)
Frederic F. Quin, M.D., President.
Edward Hamilton, M.D., Vice-Pres.
Hugh Cameron, M.R.C.V.S., Vice-Pres.
Stephen Yeldham, M.D., ex Vice-Pres.
Thos. R. Leadam, M.R.C.S., Member of Council.
J. B. Metcalfe, M.D., Memb. of Council.
J. Rutherford Russell, M.D., Hon. Secretary.

British Homœopathic Society.

Cattle Plague Commission,
House of Commons (Principal Floor, Room 10.)
Westminster, S.W.
20th December 1865.

Sir,

I have laid before the Commissioners your letter of the 14th instant, with the enclosed paper described as a Report from the Medical Committee of the Cattle Plague Association.

I am under the necessity of requesting that you will in future have the goodness to embody in your own letters any statements or observations which the Association may wish to have brought to the notice of Her Majesty's Commissioners.

I am, Sir,
Your obedient servant,
Mountague Bernard.

R. Buchan, Esq.

III. Report by Veterinary Surgeon Thomas Walton Mayer, Royal Engineer Train, on the trial of Homœopathic Treatment in Norfolk.

Castle Hotel, Norwich,
Jan. 1, 1866.

Sir,

The experiments relating to the "treatment of the "cattle disease by homœopathic methods in Norfolk," which I was instructed to "watch and report upon," being concluded, I have the honour to submit the following details for the consideration of the Cattle Plague Commissioners.

During the last four weeks 45 animals have been submitted to homœopathic treatment by veterinary surgeon Moore, assisted by veterinary surgeon R. Moore, his son, and veterinary surgeon Emerton, My previous reports have informed you that these cattle were located on four separate farms. Of these, 40 are dead; one only is cured; two are doing well; one is remaining, whose ultimate recovery is doubtful; and one remains unregistered, not having shown any particular marked symptoms of the disease.

On all these farms the disease prevailed when Mr. Moore commenced his duties. At Mrs. Bond's one heifer was very ill; at Mr. Hickling's a cow; at Mr. Bulwer's a bull, and several other animals were affected with the disease; and at the Marquis of Lothian's a case, exhibiting the disease in its most aggravated form, only lived a few hours after Mr. Moore's arrival.

Under these circumstances, and in accordance with the resolutions of the Norfolk Cattle Plague Association, the whole of the cattle on these farms were placed in the hands of the Homœopathic Association for treatment. The manner in which the experiment has been conducted is detailed in my letter of the 3d ultimo.* But in this, as in

* Mr. Mayer had made the subjoined suggestions, which had been agreed to by Mr. Moore :—

1. On every farm where the disease makes its appearance, and the owner consents to have them treated homœopathically, the cases shall be divided into two classes, viz. registered and unregistered, the former those that are sick and affected with the disease, the latter those that are undergoing preventive treatment or otherwise.

2. The experiments shall be carried out by daily or repeated observations made at stated visitations by the veterinary surgeons employed by Her Majesty's Cattle Plague Commissioners, and by the Homœopathic Association, accompanied by the Chairman or some other member of the Norfolk Cattle Plague Sanitary Committee.

Miscellaneous Papers and Correspondence.

all cases, I acted under your instructions, by only registering those cases which by repeated observation I was persuaded were affected with the disease.* This will account for my reports showing one of these animals remaining still unregistered, and others not appearing registered until the third or fourth of the month.

On our first visitation of the farms of Mrs. Bond and Mr. Hickling most of the cattle ware out, on good dry pasture land with sheds; but Mr. Moore considered it necessary for their treatment that they should be placed in sheds convenient to the farm buildings, and this was accordingly done. At Mrs. Bond's the whole of the cattle were housed in sheds, in which a large number had previously died, in the closest proximity to manure heaps filled with the excretions of these animals. So also at Mr. Hickling's the cattle were removed into sheds out of which diseased bullocks had been slaughtered. It being no part of my duty to suggest how the animals placed under treatment should be arranged, I merely record the fact, that these animals were placed in this position by the direction of veterinary surgeon Moore, in consequence of its afterwards having been made the subject of complaint. Had I been invested with any voice on the subject, I should not have consented to animals affected in various stages of the disease being exposed indiscriminately to the virulent effects of poisonous exhalations.

The location of Mr. Moore and his staff at the village of Cawston enabled these gentlemen, during the greater part of the month, to give the whole of their attention to the stock on these *two* farms; the cattle at Heydon being visited *once* during the day.

Subsequently Mr. R. Moore proceeded to the Marquis of Lothian's, and remained there during the visitation of the disease.

According to the arrangements entered between myself and Mr. Moore, daily observations were taken of the whole of the cases under his treatment, and the symptoms carefully noted and described. The stations were visited by myself almost every other day. On these days the notes were taken by myself, and, whenever an opportunity afforded itself, the post-mortem appearances have been recorded. To these have been added the notes taken on subsequent days by Mr. Moore, and the whole have been compared together. By this means I hope an accurate and complete account of the varied symptoms developed in each case of this dreadful disease is exhibited. The whole have been copied from my note book into a journal for the information of the Commissioners.

From this source I propose now to lay before you, as briefly as I can, the results obtained during the course of these observations. It would appear from a careful analysis of the symptons detailed, that the cases may be classed under four different stages, all requiring and receiving different methods of treatment.

1. The *first* contains those cases in which the premonitory symptoms are but slight. They are indicated by an increase of the heart's action, the pulse ranging from 86 to 120, and generally wiry. The respiration is from 30 upwards. The countenance, when not excited, appears anxious. The ears are thrown back, alæ of nostrils swollen, so as, in some instances, almost to close the aperture; schneiderian membrane inflamed; slight watery discharge from nostrils; vagina inflamed in streaks.

2. The *second* stage is one in which the animal's appearance begins to excite attention: it grinds its teeth, its coat stares, and it appears occasionally in pain; but the secretion of milk is not diminished, nor has feeding or rumination ceased. This stage of the disease commences about the fourth, fifth, or sixth day from the proceeding. The swelling of the alæ of the nostrils diminishes; the pulse ranges from 80 to 90, and the respiration from about 24 to 30 and upwards, with crepitation in one or both lungs. There appears on the nose, along its margin, close to the hair, and occasionally along the back, vulva, udder, &c., a papular or vesicular eruption of a dark copper or bronze colour, when pulled away showing a red spot slightly depressed in its centre, but on the nose rapidly becoming dry and pitted. There is a watery discharge from the eyes and mouth. The gums and buccal membrane exhibit sometimes a faint blush. The vagina becomes redder, the animal appears dejected, and may be seen resting his head on the manger, or pushing it against a post. There is costiveness; the fæces containing mucus, and the urine is normal.

3. In the *third* stage the signs of the disease become unmistakeable; feeding and rumination are either totally or partially suspended, and the secretion of milk ceases. The affection, running its course without relief, exhibits a greater change of symptoms; there is a twitching of the muscles of the body; the extremities are hot and cold alternately, with occasional shivering fits. The pulse continues to vary from 80 upwards, the respiration from 30 to 70 or 80; the crepitation of lungs continues, with distressing cough; discharge of tears from eyes, eyelids swollen, also increased secretion from mouth and nose. The animal grinds his teeth; the buccal membrane becomes more highly coloured, and the gums reddened; constipation is generally existing, the fæces dark coloured, covered with mucus; urine sometimes normal, at other times high coloured. If the vesicular eruption has not been previously thrown out, it is frequently not apparent in this stage.

4. In the *fourth*, or last stage preceding death, the pulse is about 88 or as low as 54, small and wiry—frequently, even a few hours before death, full; respiration 36, quick and laborious, sometimes retained, grunting; very anxious countenance; mucopurulent discharge from eyes and nose; copious flow of saliva from mouth, gums reddened, eruptions of a cauliflower or encrusted form, containing pus, on nose, alæ of nostril, underlip, vulva, and vagina; excoriations in mouth aud under-lip; buccal membrane frequently spotted; breath fœtid, conjunctiva injected; eyes sunk; great prostration of vital powers. It neither feeds or ruminates; secretion of milk gone; profuse diarrhœa with mucus and blood; fæces extremely fœtid; urine high coloured, sometimes bloody, and then termed black water.

1. Mr. Moore's treatment in the *first* stage consisted in the administration of aconite 3 sol. 10 drops in a wine glassfull of water every three hours.

Diet.—Cut-turnips, oilcake, bran, meal, in some cases portions of hay, but all in smaller quantities than usual.

2. *Second* stage, ammoniam causticum and arsenicum 3 sol. 10 drops in a wine-glassfull of water every three hours alternately.

Diet.—Mashes and boiled turnips; oatmeal gruel and porter every three or four hours.

3. *Third* stage, the treatment varied in these cases according to the preponderance of the symptoms when crepitation of the lungs was heard, belladonna 3 sol., and phosphorus 10 drops in a wine-glassfull of water was given every three hours alternately. In others aconite, and phosphorus every two hours; and in some cases arsenicum and nux vomica in similar doses as above, and at the same period.

Diet.—Mashes only; gruel with ale or porter, half a pint of the latter to two pints of gruel every one, two, three, or four hours according to circumstances.

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3. It is intended to exclude fat stock, and confine the cases to young and store stock.

If the association think proper, there is to be no limit to the number of cases registered, and preventive measures may be adopted towards the remainder; the whole county being secured for the field of their operations.

4. It is important that the Government Inspector should be furnished on his varied visitations by the homœopathic veterinary surgeon with a daily account of the symptoms, nature, and quantities of the medicinal agents employed by the Homœopathic Association; the different features the cases present can then be tested with ease and accuracy.

5. It is very desirable during the course of these experiments that the utmost precautions should be taken to guard against the spread of the disease whilst the animals are under treatment or observation, and especially from farm to farm.

6. It is also important that the owners of stock who have placed them under the care of the Homœopathic Association should be cautioned against any interference with their treatment, that they should attend strictly to the instructions given, nor desire the destruction of the animal except on a representation of the parties interested.

7. Instructions to the persons in medical charge.

As far as possible note the variable symptoms, the number of pulsations and respirations, as well as the nature of the secretions.

Be particular that the quantities of the medicinal agents are accurately administered, the effects produced watched in the most careful manner, and the general directions given carried out with the greatest exactness.

[A clause to the effect that "should any animal be placed on "the register for the plague, and some other disease should su- "pervene during his treatment, the case should be struck out of "the list of experiments," was not agreed to by Mr. Moore, except in the case of aphthæ.]

* Mr. Mayer was desired to distinguish in his reports clear cases of disease from such as, in his opinion, were doubtful.

4. *Fourth* stage.—In these cases phosphorus and sulphur, arsenicum and rhus, arsenicum, rhus, and ammoniam causticum, nux and arsenicum, belladonna, rhus, and arsenicum, pulsatilla and arsenicum, ammoniam causticum, phosphorus, and arsenite of iron, mercurius corrosivus and phosphorus, and some others will be found to have been administered in the 3 sol. and in similar quantities to those already stated every two, three, or four hours in alternate doses, as was considered necessary.

The diet consisting of meal or flour gruel only with ale or porter in the proportions stated.

In addition to these remedial agents, at Mrs. Bond's, the applications of wet cloths to skin and vapour baths were tried to several animals without relief.

At the Marquis of Lothian's a very nice hot-air bath was constructed in a few hours, in which nearly all the animals, at suitable times, were placed. The heat was raised and maintained to 120 degrees; some of the animals sweated; others did not; in most instances it seemed for the time to produce relief, but it was only of short duration, the return of animals from a heated atmosphere to houses in which the temperature would be barely 50 degrees was not likely to lead to permanent benefit.

The results obtained by the homœopathic treatment I have already stated at the commencement of this report. If any members of the Commission should be desirious of examining for themselves the symptoms and treatment daily recorded in each particular case, they cannot fail to observe that in scarcely any instance has the disease yielded to the remedial msasures adopted, and that it arrested its course towards speedy and certain death in a few instances only.

With reference to the valuable bull belonging to W. E. L. Bulwer, Esq., of Heydon Hall, which I considered cured, I propose to give a short account of his symptoms and treatment.

Dec. 1st. Pulse 125, respiration 80, grunting, profuse muco-purulent discharge from both nostrils, tears from eyes, vesicular eruption on nose, mouth, and shoulders, very anxious countenance, great prostration of strength. Purging and tenesmus. Treatment, ammon. caust. and arsenicum 3 sol. 10 drops each in a wine-glassful of water every two hours alternately. Diet, oatmeal gruel, two pints every hour, along with half a pint of porter, except during the night.

Dec. 2d. Pulse 84, small and weak; respiration 12; coughs, grunting ceased, mucus discharge from eyes; purging not so great; general appearance improved, but the animal looks as if under the influence of a narcotic. Medicine continued; to have half a pint of porter every two hours in a quart of gruel, and a handful of cut turnips and a little scalded hay.

Dec. 3d. Pulse 88, respiration 12; continue med. diet as before.

Dec. 4th. Pulse 76, small and weak; respiration 14; increased discharges from eyes and nose; spots on nose and shoulder continue; feeds better; fæces improved, but the animal looks more anxious. Treatment, ammon. caust. and aconite every three hours alternately. Diet, gruel and porter only.

Dec. 5th. Pulse 66, stronger; respiration 14, and tranquil; coughs, rumination suspended, general appearance improved. Phosphorus and arsenicum every four hours alternately. Gruel and porter continued, and a very small quantity of boiled turnips with bran was allowed.

Dec. 6th. Pulse 72; respiration 16; coughs; feeding well; looks better; eyes bright, but discharging mucus; slight grinding of teeth; fæces soft and slimy; passing undigested food. Continue med., and diet as before.

Dec. 7th. Pulse 54; ruminates a little. Treatment arsenicum and phosphorus every four hours; diet as before.

From this date until the 13th, the bull continued about the same, when he had a relapse in consequence of some raw turnips having been given to him, contrary to Mr. Moore's orders. On a return to his former diet, and the administration of arsenicum and rhus every two hours alternately, he again commenced to improve, and this steadily continued, except whenever his attendant persisted in giving him improper food, until the 28th instant, when I considered him cured. He had, however, been treated with medicine, gruel, and porter up to that date.

The two cases doing well were taken in the first stage of the disease, the system throwing out the vesicular eruption early. These have been treated very similarly to the bull.

One case still remaining is a cow belonging to Mr. Bulwer. Having cast her calf, she suffers so much from debility as to render her ultimate recovery doubtful.

The cow on Mrs. Bond's farm, which has remained during the whole of these experiments unregistered, is in good health. She is a wild and excitable animal that would not allow herself to be examined by Mr. Moore, his assistant, or myself. She has had medicine administered to her regularly on oilcake, but never exhibited such decided symptoms of cattle plague as to lead me to make any further record of her case than that contained in my journal.

I should like to have concluded this portion of my report without further remark. Every veterinary surgeon is acquainted with the difficulties connected with the attendance on diseased cattle, and there is great truth in the observation made by Mr. Moore, in his book on the cattle plague, wherein he states, "I have often reason to be "annoyed at the ignorant and careless fellows who look "after cows, or rather who don't and won't look after "them; and many cases, not only of the cattle plague but "also of pleuro, milk fever, are lost through sheer neglect "and disobedience of orders." Knowing this, it was not surprising to find that in the course of these experiments Mr. Moore complained that the attendants on the cattle exceeded their instructions, or deviated from the orders which had been given. But the persons most complained against having been publicly exonerated from any blame, I think it not necessary that I should say another word on the subject.

From information derived during the course of these experiments, and from observations which I have made in other parts of the county, with reference to this disease, as well as from the post-mortem appearances I have recorded, I believe that some important facts have been ascertained which tend to throw considerable light on the true nature of this formidable disease. Some of these I have already alluded to in my letter of the 9th ult., but the whole I think (with the permission of the Commissioners) had better form the subject for a separate report, which at an early period I will endeavour to place before you.

I have the honour to be,
Sir,
Your obedient servant,
THOS. WALTON MAYER,
Vet. Surgeon, R.E.

Mountague Bernard, Esq.

APPENDIX D.

Consular Despatches respecting the Cattle Plague in Eastern Europe.

Consular Despatches respecting the Cattle Plague in Eastern Europe.

Southern Russia (Kherson and Bessarabia).

Consul-General Murray to the Earl of Clarendon.

My Lord, Odessa, November 24, 1865.

It having been brought under my notice that Cattle Plague, which has recently afflicted England, exists almost permanently on the steppes of Kherson, I have caused inquiries to be made among the peasantry, and have now the honour to report the result.

It appears that, though the attack differs in its symptoms, inflammation arising from cold is given as the true cause of it. There are several modes of treatment more or less efficacious, but the most common is, to throw the diseased animal into a profuse sweat with as little delay as possible, taking especial care to protect it from chills for two or three days afterwards, when a change of pasturage, or, if in winter, stabling in a warm building seems indispensably necessary to avoid relapse.

The sweat is usually produced by covering the animal up with heavy cloths, and making it, at the same time, inhale the fumes of hot bran, salt, and steamed hay.

Another mode of treatment is, to apply friction with cloths or brushes, covering up the animal carefully afterwards.

A third is to rub the animals well with vodki (a coarse kind of brandy) and salt, especially along the spine and over the stomach.

One of the farmers on Count Branitzky's estate near Kieff said he had seen most successful results from the use of vapour baths, which he considered the best treatment known, provided there was good stabling and covering at hand, otherwise the animals are liable to subsequent chill, whereas no such danger threatens those on which the same effect is produced by friction and covering up, especially if the operation is performed in the open air and the cattle put under cover without delay.

Medicine is seldom prescribed, but sometimes a little nitre dissolved in hot water is given lukewarm during the sweat, or immediately after, and linseed gruel, with gentian to excite appetite, are also now and then administered, when the violence of the attack subsides.

One peasant out of fifty who were questioned, recommended warm injections of tobacco water, while another highly praised bleeding; both confessing, however, that when the malady was of a bad type they had not been very successful with either treatment.

One farmer residing at Ananieff said he had effected many cures four years ago by giving drenches of warm milk in which garlic had been boiled. Another from the same place asserted that he had found repeated doses of vinegar and cold water of great service when every other remedy had failed.

In the district of Alexandria a decoction of two herbs named "hash-ha" and "hinbia," given warm, is said to be very useful in stopping flux and allaying pain. The names of these herbs, however, do not seem to be Russian, and are not known by the druggists here; probably "hash-ha" may be the Turkish "khash-khash" (poppy heads), and "hinbia" the Turkish "hindiba" (chicory). They should be given and persevered in from the commencement of the attack, but if given to milch cows the milk should not be used as food for several days after.

The following is the receipt for the decoction above-mentioned:—hash-ha, ½ lb. pounded; hinbia, 2 lbs. Boil for an hour and a half in two gallons of water, and administer in doses of about a large wine-glass full every half-hour until the pain ceases and the flux diminishes.

It is perhaps worthy of remark that, according to a popular belief, the Cattle Plague originated in the Government of the Taurida from the bite of the black spider, and gradually as herd after herd were driven to the northern markets, the disease spread throughout Russia. It is asserted to be renewed from the same causes in years of drought.

Without inviting implicit faith in this theory, it should be added that these venomous insects, whose webs cover thousands of acres of land, produce excruciating suffering by their bite, and occasion such serious illness among the shepherds that it is necessary to send the men who are bitten to hospital.

It is stated on good authority that the malady seldom attacks the same animal twice, although sent afterwards to graze amongst herds of diseased cattle.

Cattle are not slaughtered to prevent contagion, but several measures are adopted to arrest the spread of the disease:—

1. Fumigation of stables and sheds with the smoke of dried pumpkin leaves, or that of wild aromatic herbs.
2. Isolation of the diseased cattle, keeping them as much as possible to leeward of the sound.
3. Pots or pans of tar placed here and there in the cattle-sheds or stables.

Some of my informants state that there are localities where the disease has never penetrated, though surrounded and in free communication with infected places. Men are known to have caught the disease from cattle, but such instances are rare.

Whenever the cattle disease is very virulent, however, sickness among the peasantry is more prevalent on the Steppe.

Sheep are liable to catch the disease in years when the epidemic rages with violence, and this occurs when the second or autumn crops of grass fail in seasons of drought.

Some dogs which had eaten the meat and offal of diseased animals are stated "to have gone mad," and their bite is said to engender the epidemic in a few hours.

The late inspector of the Kherson Hospitals has observed that diseased cows have been cured by homœopathic treatment when other remedies had failed; and the statement of this gentleman is supported by other corroborative evidence of great force and respectability.

I have, &c.

(Signed) E. C. Grenville Murray.

Consul-General Murray to the Earl of Clarendon.

My Lord, Odessa, January 8th, 1866.

The following important information respecting the Cattle Plague has been kindly supplied to me in answer to a series of questions I addressed to Prince

Manoakbeg and the principal landowners and cattle breeders of Bessarabia. As it differs materially from the information transmitted to your Lordship from the province of Kherson, in my Despatch, dated November 24th, 1865, No. 61, and as I can depend on the facts stated being in every particular the result of actual experience, I lose no time in submiting them to your Lordship's attention :—

1. The Bessarabian cattle owners and breeders state that the Plague during the last few years have been permanent in New Russia. It exists sometimes in one district, sometimes in another, of that vast country. Up to the present time nothing is known with certainty either of the true cause of the disease, or of the proper means of treatment for its cure. On one point only there exists no doubt,—it is certainly contagious.

2. No remedies which have been yet tried, neither fumigation, friction, bleeding, or medicine, have met with enough success to warrant their recommendation. From time to time a few beasts recover, and each person attributes their cure to the remedy he has employed ; but general experience has not confirmed such assertions in any case.

3. One opinion only appears to merit serious attention, and is now under anxious consideration. That opinion is in favour of vaccination, which the Imperial Government has undertaken to introduce throughout the infected districts by competent veterinary surgeons employed for that purpose. Time only can decide whether vaccination will afford a sure protection from the disease ; but at present it seems to promise more satisfactory than anything else which has been tried.

4. Effective means may be taken to restrain the Plague from spreading. For this purpose it is advisable, as soon as it is found to exist in any district, that all communication with other places should be strictly prohibited.

5. Dead animals should be burned as soon as possible, and in no case should it be allowed to skin them previously for their hides. They should be buried in the state they die.

6. Great care should be taken not to suffer diseased beasts to drink out of the same troughs as healthy ones.

7. Healthy cattle should be separated at once from the diseased ; and immediately any beast falls sick among them, the healthy cattle should be taken away and transferred to other pasturage. By these means large heads have been entirely saved.

8. These facts are indisputable ; but there is still to be mentioned a probable theory as to the origin of the malady.

9. It is to be observed that the disease rages more violently in the south of Russia than in the north, that it generally breaks out in autumn and not during the great frosts ; therefore it seems clear that cold is not only far from being the first cause of it, but has not even any influence over it. It is well remembered that before the year 1846 (when free trade in corn began with England), and when Odessa exported much less grain to foreign countries than now, this disease was very rare ; but it appeared always after every campaign in the wars with Turkey. Now these wars occasioned a great deal of cartage for the commissariat of the army. The waggons used by the commissariat were drawn by bullocks, who were thus forced to make long journeys during the great heat of summer across arid steppes, where no pasture or wholesome water could be found ; the Plague soon seized them, and they rotted and died in great numbers.

The same cause will continue to operate in a greater or less degree until the establishment of railways puts an end to the transport of merchandise for long distances by oxen ; until then it is more than probable Russia will be always devastated by this terrible malady.

Oxen are principally employed on the hardest service during three or four weeks of the hottest part of the year, during which they have no other food than the withered herbs they can crop by the roadside.

Consular Despatches respecting the Cattle Plague in Eastern Europe.

Every year more than a million waggons, each drawn by two oxen, coming from different parts of the country, arrive at Odessa alone. As they draw nearer and nearer to their journey's end their food grows more and more scanty, and worse in quality, so that they are reduced for several days following to feed upon the meagre roots of grass, which they swallow mixed with dust, and quench their thirst with the muddy liquid which remains of the stagnant water left in ponds and puddles by the roadside.

10. This seems to be really the sole cause of this terrible disease ; and the waggons returning to their several houses spread it throughout the country.

11. On examining an ox attacked by the Plague it will be found that it first becomes dull and spiritless, it ceases to ruminate, it eats with difficulty, and its sufferings manifest themselves by a violent diarrhœa. This is a proof that the disease lies in the digestive organs, and probably springs from improper nourishment.

The opinion of French doctors that this sickness may be caught by men from diseased cattle is not warranted by experience in Bessarabia, no case having been ever known to have occurred there.

The Plague does not appear either to be caught by sheep, which have a disease of their own also contagious, but which differs very much from the Cattle Plague among oxen ; and it may be remarked that these two diseases very seldom exist at the same time and place.

I have, &c.
(Signed) E. C. Grenville Murray.

Consul-General Murray to the Earl of Clarendon.

My Lord, Odessa, March 8, 1866.

I have the honour to submit to your Lordship's attention the following information respecting the Cattle Plague, which I have received from Count Tolstoy, President of the Imperial Agricultural Society of Southern Russia :—

1. In this province the losses of cattle by Plague are innumerable.

2. These losses are attributed to the neglect of all precautions to prevent them.

3. The mortality caused by the Plague continues till it ceases of itself ; and no curative treatment has been yet adopted with success.

4. It should be remarked that there is a tendency among farmers to exaggerate their losses by the Plague, and to attribute the deaths of cattle by other diseases to that malady.

5. Careful observations made in Southern Russia furnish strong reason to believe that cattle are subject to diseases closely resembling cholera and typhus.

6. When disease appears, therefore, among a valuable stock, it will be prudent to pay close attention to the particular symptoms of every case ; for although from 10 to 60 per cent. of the animals attacked by the Plague do not recover, yet the loss need not be so great from cholera or typhus, which may be treated frequently by effective remedies.

7. Inoculation has been tried hitherto without a decided result ; but it has been suggested that if the malady could be communicated in a mild form, inoculation would be the best precaution to take against it, as it has been satisfactorily proved that it never attacks the same animal twice.

8. Many experiments have been tried to communicate the disease in a mitigated form by inoculation, such as dilution of the pus, and mixing it with other matter ; but it has been suggested that the best means are in the first place to inoculate a healthy animal not more than one year old, and from that animal afterwards to take matter for the inoculation of others. It is confidently stated that the disease certainly diminishes in intensity as it is transmitted by matter taken from

Consular Despatches respecting the Cattle Plague in Eastern Europe.

beasts farther and farther removed from the one originally attacked by the Plague in the natural way.

9. Mr. J. A. Petroff, in a valuable paper contributed to the Imperial Agricultural Society, states that some years ago he became possessed of large herds of cattle, but has never suffered any considerable loss by the diseases which made sad havoc among the cattle on neighbouring estates. He ascribes these good results to the care taken of his cattle. In winter they are kept in covered inclosures, sufficiently large to allow them freedom of movement and moderate exercise. They are fed on sound hay, carefully chosen, and free from must or deleterious weeds, and to each animal is daily given a small portion of salt.

10. In summer, when there is fresh pasture and good water, the salt is only given once a fortnight.

11. In seven years, terminating with the close of last year, scarcely any disease has appeared among the cattle so treated.

12. Mr. Petroff states that owing to the precautions and rational mode of treatment adopted by him, his losses at the worst times have never exceeded 10 per cent.; while the loss suffered by his tenants and neighbours, who have not taken such precautions, reached nearly 50 per cent.

13. The hides of diseased animals may be preserved by dipping them in a solution of line, and then exposing them to the air for 24 hours.

14. A strong solution of salt will perfectly answer the same purpose.

15. Healthy animals have been wrapped in hides so cured, for the sake of experiment, without any ill effects.

16. It is strongly recommended, when the Plague appears, to leave the animals attacked by it to take their chance where they are, and to remove the healthy ones immediately to fresh pastures, as the Plague is sometimes believed to be purely local.

17. A superstition exists among the Russian peasantry that the Plague is stopped by being transferred to a neighbour's cattle; it is as well, therefore, to guard against any malicious act dictated by this ignorant notion.

I have, &c.
(Signed) E. C. Grenville Murray.

Consul-General Murray to the Earl of Clarendon.

My Lord, Odessa, March 23, 1866.

The following information has been furnished me by General Hamm, Chief Inspector of the German Agricultural Colonies of Southern Russia, in reply to questions which I addressed to his Excellency on the 7th February respecting the causes of Cattle Plague, and the best known means for its prevention and cure. The German agricultural colonists, generally remarkable for their intelligence and prosperity, are the largest cattle owners in this country; and, as I am aware that General Hamm has courteously taken great pains to obtain from them facts derived from their own actual experience, the result is doubtless entitled to respectful consideration.

1. *Causes of Plague.*

The chief causes of this disease in the first instance are overdriving during great heat and bad weather, insufficient or improper food, and stagnant water, or sudden change from good and plentiful food to scanty and bad food.

2. *Sanitary precautions and Police regulations.*

Cattle in the German colonies are supplied with dry food every morning before being sent out to grass, a handful of salt being mixed with the dry food three times a week. Sufficient salt and vinegar are added to their drinking water to give it an acid taste.

They are carefully examined daily, and the healthy immediately separated from the diseased. Food and everything touched by diseased cattle is destroyed or thoroughly cleansed. Dead cattle are buried three yards deep, far from pasture, and where their graves cannot be disturbed by dogs. The bodies are covered with quicklime, and the graves firmly closed. But inoculation has been found the surest means to avoid plague, and this has been clearly proved by Professor Jessen, Messrs. Serguieff, Raupach, and Dr. Keller, chief veterinary surgeon to the colonies.

3. *Treatment.*

Apply a seton and a mustard plaster to the breast. The seton must be steeped every day in fresh turpentine. Burn all swellings with red hot iron immediately they appear. Four or five pounds of blood should be taken from sanguine animals. A pint of infusion of linseed mixed with olive oil should be given internally three times a day.

When the disease augments, add enough sulphuric acid and extract of "nux vomica" to the drinking water to give it an acid bitter taste. Administer also half a drachm of spirits of ammonia in half a pint of water three times a day.

Three ounces of glue dissolved in a pint of tepid water will stop diarrhœa.

Cattle Plague, says General Hamm, has so often appeared in Southern Russia and Bessarabia, and has been so minutely examined, that its course and treatment are now thoroughly understood, and I am bound to testify that the measures taken for its prevention and cure in the German colonies are found perfectly efficacious, and have caused this disease to disappear from them almost entirely.

I have, &c.,
(Signed) E. C. Grenville Murray.

Consul-General Murray to the Earl of Clarendon.

My Lord, Odessa, March 23, 1866.

I have the honour to submit to your Lordship's attention the following facts respecting the origin and history of Cattle Plague in Europe, collected from the archives of the Imperial Agricultural Society of Southern Russia and various trustworthy sources to which I have obtained access.

A.D. 809.—Cattle Plague (Pestis bovina) is first known to have been imported from the Asian shores of the Black Sea into Europe. It appeared in Hungary and Illyria, spreading rapidly throughout Germany, Austria, and Flanders, and destroying an immense number of cattle.

A.D. 820.—It appeared again in Hungary, and, after raging there with great violence, passed away to the west of Europe.

A.D. 850.—It ravaged France, Spain, and Germany.

A.D. 1240.—It re-appeared in Hungary, and spread throughout nearly the whole of Europe.

A.D. 1514.—It appeared in Spain.

A.D. 1625.—It re-appeared in Hungary, passing thence into Italy.

A.D. 1709.—It ravaged the whole of Tartary, passing thence into Russia, Podolia, Bessarabia, Poland, Moravia, Dalmatia, Croatia, and destroying immense numbers of cattle.

Between A.D. 1711 and A.D. 1713 two million head of horned cattle are known to have died in Europe from Plague.

From A.D. 1740 to A.D. 1756, Cattle Plague ravaged nearly every country in Europe.

A.D. 1765.—It was brought from Turkey into Illyria, Moldavia, and Hungary, whence it again spread throughout Europe, and only ceased A.D. 1770, after destroying 300,000 head of horned cattle in Holland alone.

A.D. 1779.—It appeared in Austria, destroying, according to Dr. Adami, 10,000 head of horned cattle in Steyermark.

A.D. 1784.—It passed from Hungary into Italy.

A.D. 1795.—It appeared during the wars in the south of Germany.

A.D. 1801.—It appeared in Illyria, Switzerland, France, Saxony, Prussia, Poland, and Russia, ravaging all these countries constantly during the wars of Napoleon.

A.D. 1827.—During the war between Russia and Turkey it appeared in Russia, Poland, Podolia, Hungary, Bessarabia, Moldavia, and Austria, lasting three years.

A.D. 1844.—It appeared in Poland, Hungary, and Wallachia.

In 1855, it appeared in Bessarabia, Podolia, Poland, Moldavia, and Hungary.

A.D. 1857.—It appeared throughout New Russia and the countries bordering on the Lower Danube.

A.D. 1861.—It appeared again in Southern Russia, Moldavia, Poland, Podolia, Hungary, and Bessarabia, lasting till 1863.

According to the valuable statistics collected by Dr. Faust, Europe has lost 200,000,000 head of horned cattle by Plague since its first appearance. The best information on the history and treatment of Cattle Plague, as well as the means hitherto adopted in various countries to prevent contagion, will be found in the works of Dr. Romazzini who first studied the disease in 1711, in those of Dr. Lanizzi who first determined its contagious character about 1715, in the writings of Drs. Sauwage, Courtiovon, Haen, Leclerc, Westerhoff, Mauchard, and in the better known books of Vink and Camper.

I have, &c.,
(Signed) E. C. Grenville Murray.

Wallachia and Moldavia.

Consul-General Green to Earl Russell.

My Lord, Bucharest, October 24th, 1865.

The Sanitary Board continues to publish from time to time in the official "Monitorul," notices similar to that which I had the honour to transmit to your Lordship in my Despatch, Consular No. 25, of the 21st August, respecting the existence of the Cattle Disease in certain districts of the principalities.

I am unable to state the number of horned cattle in Moldavia, but according to an official return published by the Government in 1860, the following were the numbers existing at that time in Wallachia:

Oxen - - -	771,224
Cows - - -	686,357
Bulls - - -	196,494
Calves - - -	335,282
Buffaloes - - -	89,182
	2,078,539

The area of Wallachia is 27,500 English square miles, of which a considerable proportion is uncleared forests.

Persons with whom I have conversed on the subject state that the "Rinderpest" or Cattle Disease was first introduced into the principalities in 1828, by the Russian army, which was accompanied by thousands of carts drawn by oxen. Ubicini, in his History of the Principalities, thus alludes to the subject: "Puis vint le terrible hiver de 1829, " pendant lequel le manque de fourrages, joint à une " épizootie, enleva plus de la moitié du bétail; alors " on se servit des paysans, comme de bêtes de somme, " pour le service de l'armée."

The first mention which I find of the disease in the archives of this consulate general, is in a Despatch from Mr. Colquhoun to the Earl of Aberdeen, consular No. 23, of the 24th July 1846, in which he states that the murrain had spread to such an extent as to give great uneasiness to the Government. The mortality in the district of Ilfov, of which Bucharest is the capital, amounted, he says, to from 60 to 80 head a day. In a subsequent Despatch, No. 25, of the 31 August 1846, he states that the disease was one well known in Gallicia, under the name of "Lōser Durre," and was extremely contagious, and propagated in spite of quarantine by the flies passing from one animal to another, when the virus was communicated generally to the eyes and tender parts of the sound animal.

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In 1858 (November 19th), a Despatch was addressed to Mr. Colquhoun from the Foreign Office, inclosing a letter from the Council Office, inquiring into the nature of the precautions taken to prevent the spread of the Cattle Disease in Wallachia, to which Mr. Colquhoun replied that that year the epizootie had been so very mild as not to call for notice. In subsequent years, during the time I have been in the principalities, the disease, though always existing, has never till lately assumed any formidable proportions; and even now it has not spread over the whole country.

The conclusion which may perhaps be drawn from the foregoing statements is, that no immediate alarm need be felt as to the ox becoming an extinct animal, for the Rinderpest is known to have existed without any perceptible diminution of cattle, for nearly two score years, in the vast plains of these principalities, where in summer the thermometer marks above 122 degrees Fahrenheit in the sun, and the air is alive with insects, followed by a long winter when the thermometer goes down to 13 below zero Fahrenheit, and the depth of snow subjects the cattle to the greatest privations.

I have heard of no instance of epidemics or sickness here, resulting from the consumption of diseased meat. Regulations exist as to placing the cattle in districts where the disease exists in quarantine, and also as to the immediate burial of the carcasses together with the hides, the latter being considered peculiarly liable to convey the infection; but I have my doubts as to these regulations being strictly enforced. The Rinderpest is officially stated to exist in this district; but several thousand oxen enter and leave Bucharest daily—all the requirements of this large inland city being transported in waggons drawn by four to ten bullocks each.

I have, &c.
(Signed) J. Green.

To the Right Hon. Earl Russell, K.G.
&c. &c. &c.

Extract from a Report from the Dragoman of Her Majesty's Consulate at Jassy, Feb. 18, 1866.

Monsieur le Consul,

Aussitôt que j'ai eu reçu votre lettre du mois dernier, dans laquelle vous me demandez, Monsieur le Consul, des renseignements concernant l'épizootie, je me suis empressé d'aller aux informations. Après bien des démarches des courses, voici tout ce que j'ai pu recueillir:

1re. Le Médecin du district de Jassy chargé, tant pour les personnes que pour les animaux, de la police sanitaire, c'est-à-dire, de surveiller les pharmacies, d'ordonner les cordons sanitaires, ou toutes autres mesures pour arrêter ou empêcher la propagation des maladies, m'a dit:—

" Que cette épizootie, il l'appelle un *Typhus con-*
" *tayieux*, parcequ'il trouve les symptômes du
" *typhus abdominal* dans les intestins des bestiaux.
" Il ne fait point de traitement, persuadé qu'il est,
" que cela est inutile; le Gouvernement ne le lui de-
" mande même pas. On se borne à des mesures pré-
" servatives, telles que isolement du bétail; pro-
" hibition du transport de fumier ou de fourrage d'un
" lieu à l'autre; abandon des peaux qui sont quelque-
" fois hachées sur le corps de l'animal mort, pour que
" la cupidité ne puisse en tirer parti par la fraude."

Cette épizootie, suivant les informations que j'ai prises, sévit dans des différents cantons du pays, depuis Novembre 1864; dans le district de Jassy, depuis environ 9 mois, et dans Jassy même depuis 5 mois; mais elle est à sa période de décroissance:

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dans ce district 32 communes ont souffert de cette maladie ; maintenant elle n'existe que dans 5 ou 6.

Dans le district de Roman le mal paraît croître, tandis que dans les districts de Bottoshani et de Dorohoy, elle est, comme à Jassy, en décroissance.

Voici ce qui m'a été dit par un employé de la préfecture :—

" Nos médecins définissent cette maladie : *Peste* ou " *Typhus*, ou encore *Inflammation intestinale*. Les " mesures préventives consistent à isoler immédiate- " ment le bétail atteint."

Quelques paysans m'avaient dit, et des employés de la police m'ont confirmé le fait, que ces mesures étaient poussées jusqu'à enchaîner ou tuer immédiatement les chiens de berger, qui avaient accompagné des troupeaux atteints ; que, quand un paysan se transporte d'un endroit, où règne la maladie, à un autre, où elle n'existe pas, on le force à quitter ces espèces de guêtres ou chaussures que vous leur avez vues aux pieds, quand elles sont faites en peau de ruminants (ces peaux, comme vous le savez, Monsieur le Consul, n'ayant pas été tannées et le poil étant encore adhérent). Les corbeaux mêmes sont chassés à coups de fusil, parcequ'ils se posent quelquefois sur le dos des bêtes au pâturage, et qu'ils peuvent inoculer la maladie avec leurs griffes, surtout si on leur a abandonné quelque part le cadavre d'une bête morte.

Je viens d'apprendre encore qu'un boyard ayant eu une quinzaine de têtes dans une écurie isolée, pensant que l'écurie demeurerait infectée, a fait abattre les bêtes à coups de fusil, et a mis le feu dans cette écurie.

Je me suis adressé au vétérinaire chargé de la vérification des animaux destinés à l'abattoire. Ce vétérinaire traite aussi en particulier quand il est appelé par quelque propriétaire (c'est Mr. Léon, que vous avez vu quelquefois). Il m'a communiqué une espèce de rapport ou *mémoire*, que je transcris mot à mot ; toutefois je vous l'envoie, tel quel :—

" *Typhus.*

" La période d'incubation varie entre cinq et treize " jours. Ces premières manifestations objectives sont " l'abattement, la prostration, avec une expression " particulière du regard que l'on ne saurait mieux " exprimer qu'en disant que l'animal a l'air sombre. " Il est comme absorbé et reste inattentif aux excita- " tions extérieures. Sa tête est un peu tendue, fixe, " avec les oreilles immobiles et portées en arrière. " Souvent de cette première période, la respiration " laryngée est un peu sonore, et peut être entendue " à distance. La rumination n'est pas absolument " suspendue, mais elle ne s'effectue plus avec sa " régularité physiologique. L'animal grince des dents " et baille fréquemment ; les reins sont plutôt raides " que facilement dépressibles sur la plupart des sujets " observés. Puis, apparaissent des tremblements " généraux, manifestes surtout en arrière des épaules, " aux jarrets et aux fesses, avec des alternatives de " chaleur à la peau et abaissement de température, " notamment à la base des cornes et aux extrémités.

" Les yeux pleurent, et les larmes qui s'en écoulent " en abondance ont une telle âcreté, qu'elles creusent " sur le chanfrein comme une sorte de sillon.

" L'épiderme se détache sur les régions de la peau " où elles se sont répandues, comme à la suite de " l'application d'un topique vésicant. Un jetage " s'effectue par les orifices des cavités nasales d'un " liquide d'abord séreux et âcre comme les larmes, et " produisant comme elles l'érosion épidermique des " parties de la peau avec lesquelles il reste en contact. " Avec les progrès de la maladie les humeurs des " yeux et des cavités nasales deviennent purulentes, " et souvent à cette époque l'air exhalé par les cavités " nasales répand une odeur fétide ; à ce moment " aussi la respiration devient plus difficile et s'accom- " pagne dans le larynx d'une sorte de bruit de corn- " age que l'on entend à distance.

" De la bouche s'écoule une salive écumeuse qui " forme des flocons blanchâtres autour des lévres. " L'épithelium de la muqueuse buccale est soulevée " par de la sérosité, sur les gencives et le bourrelet " de la machoire supérieure, et son adhérence aux " papilles de la face intèrne des joues est si faible " qu'il suffit pour l'en détacher d'une simple pression " de la pulpe des doigts.

" A une période plus avancée de la maladie la tête " est agitée d'un côté à l'autre d'une sorte de branle- " ment qui a une certaine analogie avec celui des " vieillards, et en même temps les mouvements rapides " de la respiration lui impriment une secousse de bas " en haut, qui coincide avec l'expiration. La diarrhée " ne tarde pas à se manifester, ce sont d'abord les ma- " tières alimentaires qui sont expulsées liquides, d'une " manière torrentielle, peut-on-dire, et associées à des " gaz qui leur donnent une fétidité caractéristique ; " puis quand le canal est vide, les produits des déjec- " tions deviennent séreux, et enfin à la dernière " période ils sont sanguinolents et de plus en plus " fétides.

" A mesure que la maladie progresse, les forces " s'affaiblissent, au point que les animaux conservent " de préférence la position décubitale ; la stupeur est " extrême, les yeux s'enfoncent profondément dans les " orbites, une humeur purulente remplit le vide que " s'est formé entre le globe et les paupières ; la ma- " tière du jetage est épaise, mélée de stries sanguines " et très fétide ; la température du corps est sensible- " ment abaissée, et quand on appose les mains sur la " peau du dos et des lombes, on perçoit une sensation " analogue à celle que donne le toucher d'un animal " à sang froid ; souvent à cette période un symptôme " se manifeste, déjà signalé par les anciens auteurs, " et très caractéristique : je veux parler de l'état " emphysémateux du tissu cellulaire, notamment à la " région supérieure du corps, le long de l'épine. " Quand on palpe ces régions on les sent crépitantes ; " et leur percussion rend un bruit analogue à celui " qu'on perçoit lorsque dans les boucheries on frappe " sur la peau d'un bœuf soufflé."

" Lorsque ce symptôme est apparu les animaux " deviennent tout-à-fait insensibles. Aussi les mouches " les couvrent-elles, comme si déjà ils étaient des " cadavres. Elles s'accumulent autour des ouvertures " naturelles et y déposent leurs œufs, qui quelquefois " ont le temps d'y éclore ; d'où l'apparition d'un fait " que quelques auteurs ont pris pour une expression " spéciale de la maladie, mais qui n'est évidemment " qu'un épiphénomène sans rélation spéciale avec " elle.

" Dans les femelles il existe un symptôme commode " pour le diagnostic de l'affection, lorsqu'on doit " passer en revue un certain nombre de bêtes et for- " muler un jugement rapide ; ce symptôme, c'est la " coloration particulière de la membrane du vagin, " qui a une teinte rouge d'acajou avec des marbrures " d'une nuance plus foncée. L'amaigrissement " rapide et profond des sujets est un des caractères " propres à cette maladie et qui s'accuse à un degré " d'autant plus marqué que la vie se prolonge d'avan- " tage. Les sujets deviennent alors véritablement " étiques. Leurs muscles effacés et comme parche- " minés, laissent apparaître tous les reliefs du sque- " lette, notamment à la région du bassin dont les " excavations se creusent profondément.

" La mort survient d'ordinaire du troisième au " douzième jour, rarement la vie se prolonge au-delà " de cette dernière période.

" Voici maintenant les lésions les plus remarquables " que l'on constate dans cette maladie.

" Dans le troisième estomac ou feuillet, injections " des lames multiples de cet appareil, taches écchy- " motiques diffuses sur un grand nombre ; perfora- " tions ulcéreuses de quelques unes ; dessication sous " forme de galetes des matières alimentaires inter- " posées entre elles.

" Dans la caillette, quatrième estomac, injection " trés-vive de toutes ses duplicatures, qui ont une " couleur rouge d'acajou, et dans quelques cas ulcé- " rations multiples disséminées à leur surface. Ces " ulcérations reflétent une teinte blanche lavée.

" Dans l'intestin grêle, plaques gauffrées formées " par la confluence des pustules pleines ou ulcerées " sur les glandes de Peyer.

" Cette lésion n'est pas constante dans l'intestin " grêle; mais ce que l'on observe constamment sur la " muqueuse de cet intestin, c'est l'injection générale " avec des vergetures longitudinales coupées irrégu- " lièrement par des vergetures transverses, qui des- " sinent sur la membrane un réseau irrégulier à " grandes mailles, extrêmement caractérisé.

" Dans le colon petites ulcérations extrêmement " nombreuses, dans la profondeur desquelles est " attaché un petit caillot de sang, formant relief dans " l'intestin ; en enlevant ce caillot par le grattage, on " met à nu l'ulcération assez profonde qui lui servait " comme de point d'insertion. Injection générale de " toute la muqueuse du colon et de celle du rectum " vergetée et aréolée comme la muqueuse de l'intestin " grêle. La rate est généralement saine.

" Taches pétéchiales et écchymoses profondes dans " le cœur.

" Emphysème général du poumon, dont les lobules " sont isolés entre les lames épaisses du tissu cellu- " laire, qui sont soufflées par les gaz exhalés dans " leurs aréoles, comme dans celles du tissu cellulaire " soucutané.

" Injections de la muqueuse des bronches et du " larynx, et exsudation à sa surface des mucosités " purulentes, condensées en fausses membranes dans " le larynx. Aucune ulcération sur cette mem- " brane."

" Perte, 90/100."

" *Traitement.*

1*ère Période.*—" Un trochisque au fanon et admi- " nistration matin et soir un litre d'eau contenant " chaque fois 30 grammes d'acétate d'ammoniaque.

" 2*ème Période.*—100 grammes d'acétate d'am- " moniaque dans deux litres d'eau administrée soir et " matin. Dans l'intervalle de ces deux doses, il faut " faire prendre, et cela de trois en trois heures, un " litre d'une décoction ainsi composée :

" Gentian	- - -	150 gram.
" Quinquina	- - -	20 id.
" Menthe poivrée	- -	10 id.

" dans 5 litres d'eau reduite à 4½ par l'ébulition.

" 3*ème Période.*—L'acétate d'ammoniaque à 200 " gram. dans 4 litres d'eau fraiche administrée en " 4 fois de 2 heures en 2 heures, tout en continuant " dans l'intervalle la décoction sus-indiquée."

Je lui ai demandé positivement s'il était convaincu d l'efficacité de ce traitement. Il m'a répondu qu'il ne l'avait que peu ou point employé, parceque les paysans ne sont pas en état d'acheter les médicaments ; que les boyards, trop indifférents ou trop peu confiants dans le succès ne se décident que difficilement à faire les dépenses nécessaires, et que le Gouvernement ne veut pas s'en charger non plus.

J'ai eu occasion de parler avec un grand propriétaire de la Bessarabie russe, qui a une expérience de 30 ans. Il m'a dit qu'il a déjà vu cette maladie bien des fois dans ses troupeaux. Quand elle se déclare, il commence par faire saigner au cou toutes ses bêtes, d'abord celles qui sont atteintes, et immédiatement après toutes les autres. Il laisse sur place celles qui sont attaquées, et transporte les autres à 2, 3, ou 4 verstes de distance (environ 2½ milles), et il continue ainsi, c'est-à-dire, à laisser sur place celles qui deviennent malades, et à reporter les autres plus loin. A celles qui sont malades, il fait verser plusieurs fois par jour de l'eau froide sur la tête, entre les cornes, et ensuite à chaque fois il fait exercer une forte friction sur l'occiput et autour des cornes ; il m'a dit que c'est là son moyen, et qu'il avait souvent réussi à en sauver beaucoup.

En outre il a ajouté qu'il faisait transporter du mauvais foin, de la paille ou des broussailles, du fumier même autour de ses troupeaux, et qu'il y faisait mettre le feu pour assainir l'air.

En 1845, il avait un troupeau de 520 vaches ; elles furent attaquées ; il les fit saigner deux fois, et les fit changer de place trois fois dans l'espace d'un mois; il en perdit à-peu-près 400; mais la maladie ne dura pas plus d'un mois.

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Deux mois après cette maladie reparût dans ses troupeaux, mais sur une autre terre ; cette fois il n'en perdit que 90 sur 400.

En 1864, la même maladie lui est revenue, encore sur une autre terre, c'est-à-dire dans un autre troupeau de 450 têtes : saignée 2 fois ; mêmes précautions que plus haut. Perte 15 têtes.

En 1865, sur une autre de ses terres encore, se trouvait un troupeau d'environ 600 bœufs et vaches : perte 50 °/₀. Mais alors il était absent, et il faut attribuer une grande partie de cette perte, a-t-il dit, à la negligence de ses intendants, qui, à la vérité ont suivi son système, mais non avec autant de soin.

Ce propriétaire ne possède jamais moins de 2,000 têtes réparties sur différentes terres. Dans aucune la maladie ne s'est encore montrée cette année. Ce propriétaire est un des notables de la colonie armenienne en Bessarabie. Il a ajouté que, dès qu'il apprend que la maladie se déclare, il fait retrancher la ration de 60 à 70 °/₀, afin de faire maigrir les troupeaux.

Un vieillard m'a montré un registre qui lui sert d'agenda ou d'album depuis bien longtemps.

Sur ce registre se trouvent insérées les recettes suivantes, pour le cas où cette maladie se présente, car il prétend que c'est toujours la même epizootie :

" 1*ère Recette.*—Aussitôt que la maladie se déclare " faire à tout le troupeau un trou à la pointe de l'une " des cornes, et à-peu-près de la grosseur d'une plume " d'oie à écrire, au moyen d'un vilebrequin ou de tout " autre instrument pareil ; introduire dans l'intérieur ,' de la corne un peu de mercure et reboucher le trou " hermétiquement avec de la cire."

" 2*ème Recette.*—Prendre 3 ou 4 brins ou filaments, " etc. '*Radix hellebori nigri,*' les piler, mêler avec " un litre de vin blanc (une bouteille à vin de Cham- " pagne contient 2 litres d'ici), faire avaler ce vin à " la bête malade ; la faire marcher immédiatement, " aussi vite que possible, jusqu'à ce que la transpira- " tion se produise."

J'ai demandé de ce radix à la Pharmacie et on m'a remis une *racine* dont vous trouverez ci-joint quelques brins.

Il a ajouté qu'il avait essayé une fois d'empêcher les effets de la maladie par l'inoculation du sang d'une bête malade dans les bêtes saines, et que ce moyen lui avait réussi jusqu'à un certain point. Mais d'autres personnes m'ont dit qu'elles avaient usé du même moyen, mais sans résultat.

Dalmatia and the Herzegovina.

Consul Paton to Earl Russell.

My Lord, Ragusa, October 18, 1865.

I avail myself of the first postal steamer to acknowledge and give an answer to your Lordship's telegram of last night: from conversations with the persons most likely to give me information on the cattle murrain, especially the physician of this circle, who much journeys into the villages to report to his Government on the subject.

Cattle Murrain.

I.

Seat and Causes.

The original seat of this murrain of a typhoid character is the Steppes of Russia and Central Asia.

The primary cause is supposed to be the great droughts to which they are subject, and the deprivation of proper supplies of green pasturage, or other fresh vegetable aliments suitable for cattle.

The secondary or immediate cause of the murrain on this coast was contagion, marked by a peculiarly rapid and virulent power of propagation.

The disease first showed itself at Berguto, on the road from this to Trebinje, in the month of October

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1862, having come from the Herzegovina. A first Austrian medical commission sent from Vienna to Serajevo, reported that it was not the Russian Cattle Plague. But it soon showed itself to be so, and, in spite of examination of animals and quarantines, it spread in eight months through all Dalmatia.

The recent renewal of the murrain in the Herzegovina is attributed to the excessive drought of this year, as the wells were dried up, and as the cattle had to be driven in some cases 15 and 18 miles to water, they could be watered only once in three days. From the want of pasture many cattle had eaten hemlock and other poisonous herbs. This coast is very subject to droughts; the innumerable fissures and fractures of the Julian Alps (subject to earthquakes) form a natural drainage which very soon exhausts the internal reservoirs of this loosely compacted range. This summer some mills near Verlicca, which in the memory of the oldest inhabitant had never been without water, stopped all of a sudden, some internal reservoir having been drained.

II.

Symptoms.

The *external* symptoms are in the first stage,—low spirits, lassitude, and inactivity of the animal, cows being more exposed to the disease than bulls or oxen.

2d stage,—mucous hemorrhage from eyes and nostrils.

3d stage,—diarrhœa of thin yellow fæcal liquid.

4th stage,—general swelling of the body, indicating the proximity of death.

The *internal* symptoms are in the 1st stage,—the flesh and even the fat cut up a deep crimson colour.

2d stage,—increased size of liver.

3d stage,—intestines filled with mucous matter, particularly the fourth ventricle, which is the seat of the disease.

4th stage,—gangrene of the intestines preceding death.

The secondary symptoms are,—tumours which heal after the usual suppuration.

Of the power of rapid propagation of the disease by contagion there seems to be no doubt. Sound cattle driven on a road where diseased cattle have passed are said to be liable to the malady. The theory of the medical men here, that other animals may be conductors of the disease without themselves suffering from it, appears at first sight to proceed from those extreme views of contagion which are more common in the South than in the North of Europe. But it is possible that invisible corpuscules floating in the air may attach themselves to the hair of other animals, not themselves affected by the disease. It is certain that no horse has been attacked by the malady in Dalmatia, although some sheep and goats have had it.

III.

Remedies.

The animals saved by medicines or by the *vis medicatrix naturæ* are not above 5 per cent. of those attacked, we may therefore say that medical science has not yet succeeded in finding an antidote to this calamitous ailment.

The first measure adopted is the isolation of the animal by removal to a ventilated position, with a supply of fresh green forage. Healthy cattle ought by no means to be exposed to the effluvia of urine or of fæcal or mucous matter of cattle diseased; and herdsmen or dairy-maids attending on diseased cattle ought not to approach healthy cattle without fumigating or washing their clothes.

The medicines administered are preparations of sulphur, mercury, and antimony. As an antidote to the fermentation of the blood the medicine given is *hypo-solfito di soda* (not solfato), which I do not translate into English from fear of inaccuracy.

My Russian colleague tells me that a physician of Kharkoff has discovered a method of rendering cattle less susceptible of the disease.

All sick cattle are refused admittance at the frontier, the meat of the market is examined and passed by the physicians of the circle, the hospital, and the quarantine establishment.

When cattle are killed in the last stage of the disease or in the later stages, the hide is kept 48 hours in quicklime before becoming an article of trade, and tallow must be immediately boiled.

I have, &c.,
(Signed) A. A. Paton.

The Hight Hon. Earl Russell, K.G.
&c. &c. &c.

Consul Paton to Earl Russell.

My Lord, Ragusa, 23rd October, 1865.

Since the dispatch of my No. 12, I have learned nothing further which materially modifies the opinions therein expressed as to the Cattle Murrain.

The principal apothecary here, a good practical chemist, whose interest it is to sell medicines, is of opinion that administering medicines in the Cattle Disease is a mere throwing away of money, and that isolation if the case is slight, and slaughter if the case is advanced, is the only effectual mode of dealing with the malady. He regards stercoral effluvia as the chief infecting agent.

The captain of the Circle (not a medical man, but a man of practical common sense) through whose hands all the reports have passed, tells me that the promise of the Government to pay for all the cattle slaughtered for the public benefit was effectual in inducing the peasants to denounce first cases in new localities.

The first appearance of the disease in a new locality requires the utmost promptitude; the Cattle Disease is like fire, or a leak in a ship capable of being mastered if taken in time, but if it gets ahead then human efforts are vain and the malady takes its own course until it expends itself.

The voluminous regulations of the Austrian Government on this Murrain appear to me to be too minute, and to attempt too much. The following appear to be all that is necessary in practice:—

Prohibition of import of cattle from infected countries.

Measures to be taken to induce cattle owners to practice no concealment of first cases in an uninfected locality.

Measures of isolation and cleanliness as mentioned in my No. 12.

Rigorous supervision of cattle markets and shambles.

No animal to be killed for the butcher's stall in the night under a penalty.

No animal to be killed for sale without a schedule of health from the proper inspector.

Meat stalls to be rigorously inspected.

Measures to be taken against infection through remains of slaughtered animals.

I have, &c.
(Signed) A. A. Paton.

To the Right Hon. Earl Russell, K.G.
&c. &c. &c.

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